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Cover Picture. Children at Play, Baffin Island. *(Photo: National Film Board, Canada)*

Frontispiece. Wheatfield, Yukon. *(Photo: National Film Board, Canada)*

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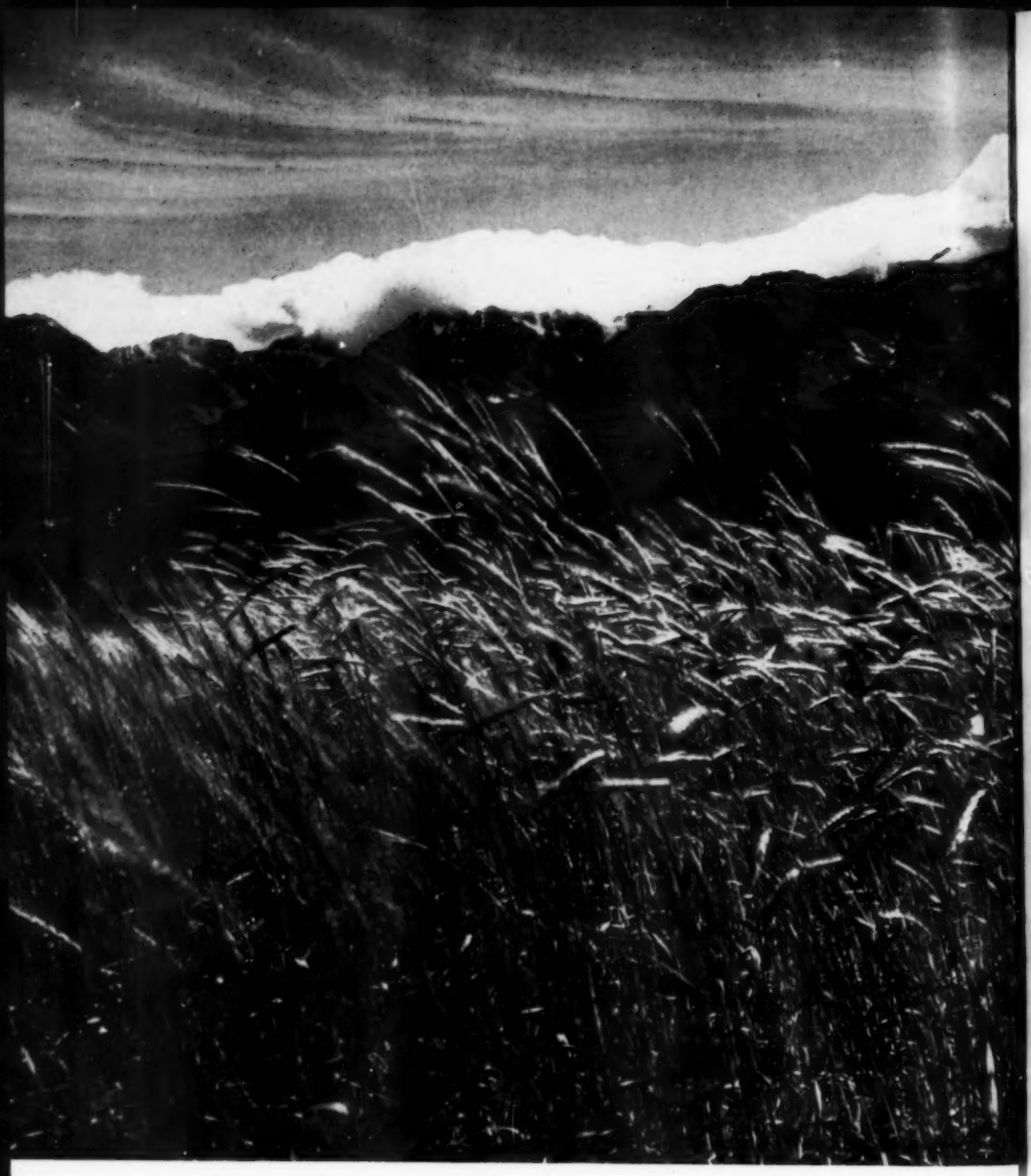


Bearded Wheat at Dominion Experimental Farms, mile 1016 Northwest Highway, (near Haines Junction), Yukon.

(National Film Board Canada, photo)

AGRICULTURE IN ALASKA

By G. W. Gasser

AGRICULTURE in Alaska dates from the gold rush days of '98. During the intervening fifty years enough evidence has been presented to convince the most doubting that a great variety of crops can be grown within the boundaries of the Territory.

The total land area of Alaska is approximately 586,000 square miles, more than twice the size of Texas. Because of the great range of latitude and longitude the climate of Alaska is widely divergent. For example the highest average annual precipitation of 248 inches occurred on Baranof Island in southeastern Alaska. The lowest, 4 inches, is recorded at Point Barrow the most northerly tip of Alaska. Temperature extremes are centred in the Yukon River area at Fort Yukon which is on the Arctic Circle. There the maximum has been 100°F. and a minimum of -71°F.

However, these extremes have no agricultural significance because the main farm areas are centred in the Tanana Valley, the Matanuska Valley and the Kenai Peninsula. The crops grown in these areas are substantial proof that climatically almost three-fourths of Alaska lies within the north temperate zone.

Today in Alaska there are about 15,000 acres actually producing farm crops, out of an estimated 7,098,000 acres adjudged arable. Truly, Alaska is a vast and sparsely populated country. Alaskans invite and encourage settlement, preferably by those qualified to pioneer. Agriculture as a business can prosper only if it develops rationally in step with increased population supported by various industries. The production of farm crops for export is definitely not practicable. Food to feed those living within the Territorial boundaries is a full-time job for every farmer now living there and for several thousand more.

Agricultural Research

Seven Experimental Stations, located at widely separated points in the Territory, were established and maintained by the U.S. Department of Agriculture. The earliest of these were started at the turn of the century during the gold rush days. Two of the seven are still in operation. The one, in the Tanana Valley was established in 1906. It is four miles northwest of Fairbanks and one mile west of the University of Alaska (P.O. College). The other Station, in the Matanuska Valley (P.O. Palmer), was opened in 1915. The five discontinued were located at Sitka, Rampart, Kodiak, Copper Center and Kenai.

During the operation of these stations trials were made of hardy grains and grasses, seed of which came from every northern country in the world. Similarly trial packages of vegetable seed, many kinds of fruit-

ing shrubs and trees were also shipped in and tested. Considerable hybridization of cereals, alfalfas, strawberries and potatoes was done. Outstanding results were secured with barley, wheat and strawberries. Hybrids of the latter, hardy throughout the Territory are widely grown today and the large, lucious fruit is a favorite in many Alaskan homes.

Much work was done with dairy and beef cattle. Some interesting crossbreeding of Holstein-Galloway was done, several of the hybrids showing excellent milking ability. Another and more interesting project was crossbreeding Galloway cattle with Tibetan Yak. The first generation showed good form and fair milkers, but the males were sterile as in the cattle-bison cross.

With this experience of 50 years of experimental work and aided by increased funds, a five-year plan has now been drawn up. Administrative headquarters have been moved from College, in the Tanana Valley, to Palmer, in the Matanuska Valley. The main projects to be undertaken are:

1. Soil research including classification and mapping and studies with fertilizers.
2. Milk production as affected by feed and increased light during winter months.
3. Dairy cattle breeding through artificial insemination.
4. Raising dairy calves to determine efficient rations and their cost.
5. Pasture and range improvement and management.
6. Testing and improvement of cereal and forage plants.
7. Processing and preservation of feed to determine the relative efficiency of field-cured hay, barn-cured hay and silage.
8. Studies of poultry to discover the effect of additional vitamins, mainly D, the influence of artificial light on egg production and, on the physical conditions of the laying hen.
9. Potato breeding.

This fine field of oats will be cut for hay. Copper River Valley.

10. Studies of diseases of economic plants will be made, particular attention being given to diseases of potatoes.
11. The growth and quality of vegetables as influenced by fertilizers.
12. Agricultural engineering; development of better potato storage and handling to reduce loss by bruising and subsequent rotting.
13. The utilization of local timber in comparison with other building material in conventional frame structures.

Permafrost

The effect of frozen subsoil on the season's crop growth has given rise to many surmises. Actual growing tests indicate that permafrost is neither stimulative nor dwarfing. In the interior of Alaska where rainfall is often deficient, it is a popular belief that, as the ground thaws, water is made available to the plants. Since the ground thaws rather slowly, water would thus be held within reach of the plant roots.

When land in the permafrost region is cleared and cropped, the subsoil is completely saturated with water, because when the ground is covered by natural vegetation, thawing is limited to two feet or less. Under cultivation, the frost recedes from six feet to eight feet, especially on fields having a southern slope. The free water sinks as thawing proceeds; crop plants use some and there is also loss by evaporation. The sum total of these losses exceeds the average summer's precipitation of 7.0 inches. The inevitable result is that the subsoil on sloping land becomes depleted of water. Once this has happened crop plants depend exclusively on the water that sinks in from the surface.

Whether or not there is permafrost, the winter's freeze penetrates to a depth of from two to several feet. By the time the ground has thawed a foot or so, the surface two or three inches warms and cools according to the diurnel temperature changes. Spring planting and subsequent growth is affected very little, if any, by the mass of frozen subsoil.

Field of Hulless Barley in the Tanana Valley. There has not been a crop failure due to climate here for 45 years.

Southeastern Alaska

This is a heavily-timbered region with much precipitation and comparatively moderate temperatures both in summer and winter. Cereals do not as a rule ripen, but flourish like grasses and are capable of producing much feed as silage. There are many small gardens which taken together produce a great variety of vegetables of excellent quality. Commercial gardens could be developed in a few localities. Dairying has been profitably carried on for a number of years. Since there is a shortage of whole milk it would appear that this type of farming might be extended. The production of eggs and poultry is increasing, but at present does not meet the demand. Bush fruits, such as currants, gooseberries and raspberries thrive. Strawberries produce abundantly. Some small success has been reported with apples and cherries.

Aleutian Islands and Kodiak Island

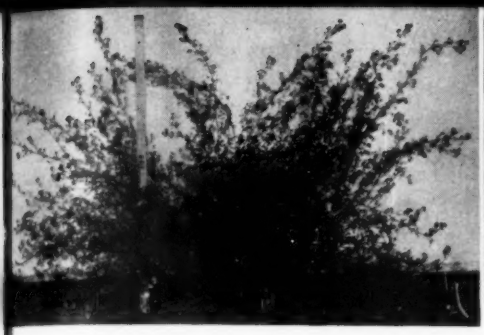
These are treeless except for the northeast part of Kodiak Island. The climate is mild, although high winds and fog are rather common. Grass is abundant and stock-raising is recognized as the principal farm enterprise. On several of the islands such as Umnak, Chirikoff, Sitkalidak, Unalaska and Kodiak herds of beef cattle and sheep have been kept for a number of years with reasonable success.

In spite of the mild climate only small areas are suitable for gardening due to the mountainous terrain, poor soil and much windy, overcast weather.

Kenai Peninsula

Many homesteaders have settled there. Conditions generally are very favorable to farming. Native grasses are abundant and cultivated grasses and cereals provide good hay and pasture. Summer temperatures are on the average too low to ripen grain satisfactorily, but the season is sufficiently long for most vegetables. The Peninsula contains many thousands of acres suitable for crop production, but the development of farming has been hindered by a lack of good transportation. The marketing of farm produce from the Homer district depends upon boat transportation to Kodiak, Seldovia and Anchorage. Such crops as potatoes, vegetables of all kinds, poultry and eggs, pork and beef are marketed. A road extending the length of the Peninsula on the west side, now under construction, will connect all the towns with Seward and Anchorage.

A cooperative organization is needed so that standard grades of produce can be placed on the market. This would require storage facilities and probably refrigeration of some kind. There is likely to be a market for all the farm products grown in the Homer district for some years to come.



Yellow-flowered alfalfa (Medicago falcata), hardiest alfalfa known, is used extensively in Alaska.

Bonny Best Tomatoes grown out of doors at Rampart, Yukon Valley—70 miles north of the Arctic Circle.

Anchorage

A large number of small farms have been developed near Anchorage during the past few years. Three hundred tons of potatoes, as well as large quantities of garden vegetables were produced during 1947. Several farmers were then feeding hogs on garbage from the army camps and the production of eggs and poultry was increasing. There is a good demand for the produce but eventually an organization for handling farm products, will be needed.

Matanuska Valley—Post Office Palmer

This well-advertised region is fully justifying the best that has been said of its crop production potentialities. Potatoes easily lead as a cash crop. Approximately 2,500 tons were grown in 1947. Yields of from 10 to 17 tons per acre, with the highest 20 tons, have been recorded. The quality is excellent. Wheat, barley, oats and winter rye are successful crops producing satisfactory yields of thoroughly ripened grain. Hay, crops of oats, alone and with peas or vetch, do well. An excellent quality of hay is made by cutting with a binder and shocking. If the crop is cut with a mower, curing on stakes is the usual practice. Silage, consisting of oats and peas has given very satisfactory results. The clovers and alfalfas grown in the United States are not found to be sufficiently hardy in the Valley. A biennial red clover and a yellow flowered alfalfa from Siberia do well. Extensive plantings have not been possible for lack of seed. Alsike and white clover with grasses make excellent pasture and are being used to some extent. Vegetables of many kinds grow astonishingly well and are superb in quality. Insect pests and diseases are troublesome at times, but with proper attention damage is kept down.

There is a network of well-graded roads, an excellent central school system, and churches. The marketing facilities are centred in a cooperative association which serves the settlers efficiently. The produce handled by the Matanuska Valley Farmer's Cooperative Marketing Association includes milk, vegetables, potatoes, pork, poultry products and beef. The

beef that is produced is a by-product of the dairy farms. Farm products are carefully graded at a central plant and are delivered to the markets in excellent condition. The Co-operative also purchases supplies needed by the farm people such as feeds, seeds, fertilizer, farm machinery and general merchandise.

There is at the present time at Anchorage and Fort Richardson a good market for produce from Matanuska Valley farms. The supply of dairy and poultry products, pork and beef, could be greatly expanded. The demand for potatoes and some garden crops is somewhat limited and it would be necessary to find additional markets if the acreage of these crops were to be greatly increased.

Tanana Valley

This is the most extensive agricultural area in Alaska, comprising approximately 7,000 square miles. The soil in the valley floor ranges from very fine sand, which is the most extensive, to fine sand. On the adjoining slopes the silt loam is considered to be as good as the Knox silt loam of the central United States. It is no surprise, therefore, that potatoes of high quality are regularly grown on the slope soils throughout the Tanana Valley region. The yields per acre are somewhat limited by the rainfall, which is approximately 7 inches for the growing season. Nevertheless, 18 tons per acre have been reported for a top yield. Excellent yields have been produced on the valley floor, but it is subject to midsummer frosts severe enough to injure potato tops but not grain nor hardy vegetables. On the slopes the interval between frosts severe enough to injure potato tops averages 105 days. For hardy plants such as pasture grasses the average number of growing days is 123. There has not been a crop failure due to climate causes in the 45 years of farming in the Valley. Grain yields per acre are:—wheat 20 bushels, oats 50 bushels and barley 30 bushels. In general, the range of possible crop production is similar to that of the Matanuska Valley, except that in the Tanana Valley the somewhat longer daylight and a few degrees more summer heat tend to hasten maturity of grains.

Arctic Circle

There are extensive areas at or north of the Arctic Circle at places such as Fort Yukon, Shugnak and Wiseman where potatoes, cabbage, cauliflower, carrots and other hardy vegetables are grown every year, and where grain hay and even ripe grain of early varieties of wheat, barley and oats can be raised.

Livestock Production

Dairying:

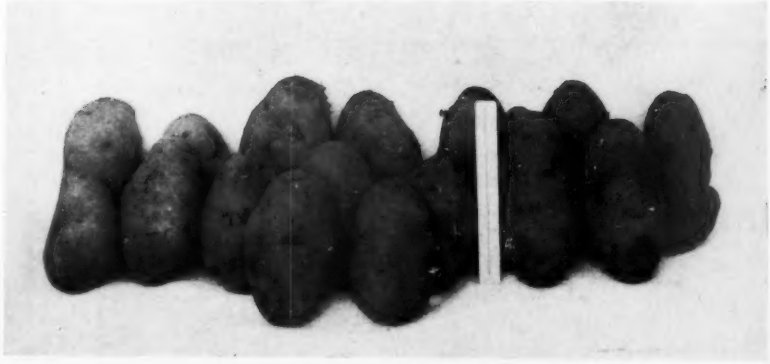
The total value of fluid milk produced in Alaska is much more than a million dollars. There are about 1,300 dairy cows, the most important

being Guernsey, followed by Holstein-Friesian, Ayrshire, Brown Swiss and Jersey. The Matanuska Valley has the largest number of dairy cows and of dairy herds. There are 33 farm dairies, all rated as Grade A. The milk is sold bottled and pasteurized at 40 cents per quart, the demand for whole milk has been so strong throughout the Territory that little if any butter or cheese is made. Under the new Agricultural Research Program several pure bred bulls of high producing milk strain have been shipped into the Matanuska Valley. An artificial insemination service is to be established this year.

Beef Cattle:

In order to discover to what extent the production of beef cattle on a commercial scale will be profitable in Interior Alaska, there will need to be tests of summer range and winter feeding. There are thousands of acres where native grass is abundant but range management and the economics of providing feed for winter, must be learned. Alaska is capable of producing large quantities of beef. Grass, the essential need, is plentiful. Careful estimates of 21 areas ranging in size from 25 square miles to 1000 square miles show a total of 6,993 square miles or 4,475,520 acres of grassland. These areas are capable of providing summer feed for 100,000 head of cattle. There is ample additional land on which the winter feed can be

This fine crop of potatoes was grown in the Tanana Valley. As much as 20 tons per acre have been grown in Alaska.



This Alaskan photograph shows a single hill of 16 potatoes weighing 13 pounds of Burpees Superior variety.

grown. Beef cattle are at present kept on two or three islands near Kodiak where they graze outside for the entire year. These herds have not been very profitable. The problem of marketing beef from the islands is most difficult. Before high-quality beef can be produced at a profit on the grassy islands of the Aleutian Chain, cold storage facilities will need to be constructed so that meat can be held until it is marketed. Anyone who considers beginning the production of beef cattle anywhere in Alaska, should first of all make a careful study of the whole question.

Sheep:

A few years ago about 1,200 head of sheep were grazed on the summer range in the Matanuska Valley, and wintered on farms where it was necessary to feed some hay and grain to them during the winter months. At the present time only a few head of sheep are to be found in this valley. The summer range is good and sheep return in the fall ready for the market. The expense of producing feed for wintering the sheep, has prevented the production of mutton and wool from being as profitable as dairying.

Two or three large herds of sheep have been kept on some of the Aleutian Islands for a great many years where they have been raised without supplemental feed. The marketing of the wool and lambs has proved a serious problem and apparently these herds have not been very profitable. However, the wool is of prime quality and brings top prices in the United States. It is probable that some protection during storms along with concentrated feed and hay should be provided for emergency use during a few months of the winter. In most parts of the Kenai Peninsula, the Matanuska Valley and Interior Alaska, sheep could graze out of doors for from five to six months, but it would be necessary to feed them during the remainder of the year. Some shelter also would be an advantage. There are a few localities, such as at Healy and Lignite on the Alaska railroad, and perhaps in the upper part of the Tanana River where the snow blows off the hills, where sheep might graze during part of the winter.

Swine:

Most breeds of swine are prolific and comparatively free from disease in Alaska. The average litter from Hampshire sows at the Fair-

Cabbage make an excellent crop in Alaska. Here is a pyramid of Copenhagen Market, heads averaging 12 pounds. Heads have been grown weighing 40 pounds.

Grain hay
at Ramp
north of
Circle.

banks Experiment Station over a period of ten years has been between seven and eight pigs per sow. Pork can be produced on pasture for about four months and finished off on locally grown grains. There is a good demand for home grown pork and pork products and they can be sold at a profit. The swine industry could be extended to many small farms throughout Alaska and would probably prove to be most profitable.

Poultry:

There is a large demand at good prices for poultry and eggs in all parts of Alaska. At present prices for eggs a good profit can be made from keeping hens, even when it is necessary to import all of the feed from the United States at prices ranging from $160.00 to $200.00 per ton. The poultry industry could be expanded on many farms in the Tanana and Matanuska valleys where most of the feed can be grown locally at a reasonable cost. Well constructed poultry houses are essential for success.

Diversified Farming

There is good land still open for homesteading in many parts of Alaska, where many farm families could produce between 60% and 70% of the food they need. It would be necessary to keep a few dairy cows, a brood sow or two and a flock of a hundred laying hens. Practically all of the feed needed for the livestock could be produced cheaply apart from the labor required. Twenty-five to thirty-five different hardy vegetables can be successfully produced. Small fruits such as strawberries, raspberries, gooseberries and currants can be grown. Wild fruits including blueberries, low-bush cranberries, high-bush cranberries and huckleberries are abundant almost every year. Men and their families who have a love of the soil and who are willing to work and make their living from the soil, can do so without the investment of a great deal of capital. The average person taking up a homestead, however, should have sufficient funds to carry him over until such time as his farm can be put into production. This would probably require a minimum of between $3,000.00 and $5,000.00. The type of farming most likely to bring adequate return is one of diversified farm crops, together with livestock. The winters are long and the work needs to be planned to keep the farmer profitably employed throughout the year rather than for only the short summer season.

Grain hay being stored at Rampart—70 miles north of the Arctic Circle.

BIBLIOGRAPHY OF ARCTIC RESEARCH

By **Marie Tremaine**

RESEARCH in the sciences, the natural, physical and social sciences, pure science, is fundamental to developments in technology, human relations and welfare, even the arts. Fundamental to scientific research is bibliography. To build and operate, for example, a weather station on a northern coast, or to construct and service a road, a knowledge may be required of the physical geography, the geology, flora, fauna and native people of the locality. Data on for example, permafrost, ecology, marine currents in a region far away, may contribute essentially to an understanding of the locality under study. Such data are the results of exploration and research carried on during centuries by sea, land and air, in the polar basin, the adjoining seas, on the arctic islands, the northern reaches of the continental land masses, and also in laboratories and study rooms in lower latitudes. Such results are published in many languages, in thousands of journals. But who knows where to put his hand with confidence on the working literature for his arctic problem? There are many lists of works on a sector; Russian bibliographies on Novaya Zemlya, on Yakutia, Hulth's Spitzbergen, Tanner's Labrador, Wickersham's Alaska. There are lists on various subjects on Eskimos, reindeer, geology, botany, etc.; publications of organizations such as *Meddelelser om Grönland*, *Skrifter om Svalbard og Ishavet*, and transactions of the Arctic Institute of U.S.S.R. whose indexes are themselves bibliographies of arctic research. There are periodic lists appearing currently in *Geographisches Jahrbuch*, and *Bibliographie Géographique Internationale* and in *Polar Record*. But the most recent bibliography of the Arctic as a whole is still Chavanne's *Literatur uber die Polar-Regionen*, published in Vienna in 1878. It was to resolve the present bibliographical anarchy that the Arctic Institute of North America promoted its Bibliography Project as fundamental to any productive program of Arctic research.

Planning and Direction

This Project was set up in June 1947, as a three-year program to produce a comprehensive bibliography of Arctic research publications. It has a Directing Committee of leading scientists and librarians of United States and Canada, in touch with current research programs of private and governmental agencies, several themselves with field experience in the North. The Committee determines policies in the preparation of the Bibliography and its members act in an advisory capacity to the Project staff in the various scientific fields represented in the literature. The staff comprises a Director, three research analysts, all experienced librarians, and three assistants at the Project headquarters, also several contributing analysts. This staff includes specialists in the principal foreign languages,

Scandinavian, Russian, German and French, experienced in the principal sciences, zoology, botany, geology, meteorology, oceanography, etc., and familiar with the collections of the principal libraries of the United States, Canada and Europe. The Project headquarters is in Washington, in space generously made available by the Library of Congress. The Project is financed by the U.S. Office of Naval Research, the U.S. Department of the Army and by the Canadian Government. It is sponsored by, and its funds are administered by the Arctic Institute of North America.

The scope of the bibliography is broad geographically, covering Alaska, northern Canada (and Labrador), Greenland, Svalbard, northern Scandinavia and U.S.S.R. and Kamchatka, the Arctic Seas and Straits and the North Polar Basin.

In subject matter the range is also wide, including geography, geology, geophysics, meteorology, oceanography, botany, zoology, anthropology, medicine, administration and government. The Project in fact, includes the various disciplines which are our avenues of approach to an understanding of the arctic world, its physical features, indigenous life, and its resources in terms of our civilization, and not least the discipline by which we may utilize these resources and adapt ourselves to the conditions of the Arctic.

Emphasis on Records of Explorers and Scientists

For a project so broad in scope the literature is obviously immense; in so limited a time some selection is necessary. The Directing Committee and Project Staff in consultation, decided to place primary emphasis on publications giving the explorers' and scientists' own record of their work in the area of interest, results of expeditions and investigations as produced by their members; then emphasis on government reports, then on discussions in publications of learned societies and scientific institutions devoted to arctic work, and so on. The Bibliography is designed to contain as much of the original records of arctic research and exploration as may be analysed and indexed in three years' time. This means the narratives of Bering, Mackenzie, Hearne, the Rosses, Parry, Back, John Rae, Nansen, Nordenskjold, Peary, Sverdrup, Amundsen, Stefansson, Rasmussen, Erichsen, the Kochs and hundreds of others whose names endure on the maps and in the literature of the Arctic. This means indexing the scientific reports from hundreds of expeditions into all parts of our area; the Canadian Arctic Expedition 1913-18 (88 separate papers), the *Vega* expedition (about 60 papers), the Koldeway expedition to East Greenland 1869-70 (about 40 papers), the Harriman Alaska expedition (about 100 papers), the Gjoa expedition; reports from the drift of the *Fram*, the *Sedov*, and the Russian North Pole ice-floe party in 1937; reports of the Thule expeditions to Greenland and northern Canada; the numerous Cambridge and Oxford University expeditions in the eastern and western Arctic; from the Wilkins, Ellsworth-Amundsen, *Graf Zeppelin*, the *Aries*,

and the numerous Soviet flights in polar regions. It means also, reports from exploratory, patrol and survey work, more or less regularly carried on in Alaska, northern Canada, Greenland, and the northern U.S.S.R., by the agencies of the various governments.

The Bibliography is arranged by author with a subject-geographic index. Under each author is the list of his works. For each work appears the title, its date of publication, the number of pages, details of illustration and analysis of its content with the geographic localities specifically mentioned. Works in foreign languages are fully described in English. Each work has a note of the library from which the analyst examined it, usually in Washington, but occasionally of necessity elsewhere.

Filing Source Material

Files of the important journals are analysed volume by volume for their arctic papers, e.g. the *Geographical Journal*, 1830-, *Petermann's Geographisches Mitteilungen*, 1855-, *Meddelelser om Grönland*, 1876-, *Geografiska Annaler, Ymer, Geographical Review*, files from the Academy of Science of U.S.S.R., of Sweden, Norway and Denmark, in fact the principal publishing media of explorers and scientists in each country where arctic research flourishes. Papers published in journals, government reports, or as parts of a larger work are listed and analysed under the author's name, with the journal etc., precisely indicated so it may be found in many large or special libraries.

The Bibliography is planned for publication in several volumes with a separate index volume (or volumes). Each book or paper analysed in the bibliography is indexed for its subject matter and for the general region in which the work was done. The entire area of interest is divided into seventy such regions and all (except theoretical) works appear under one or more of these regions. In the index the subject headings are subdivided for the general region, so that material on *Ice conditions* for example is indexed under:

Ice conditions — Baffin Bay
— Barents Sea
— Beaufort Sea
— Bering Sea
— Chukchi Sea

and so on. Similarly works under regional headings are broken down for subject matter, so that material on *Barents Sea* for example is indexed under:

Barents Sea — Atmospheric electricity
— Bathymetry
— Currents
— Fishes
— Ice conditions

and so on. In addition the index includes the names of hundreds of geographic features and all works are indexed specifically to such features prominently treated by the author. Lakes, rivers, volcanoes, capes, islands, populated places, tundras, glaciers, fiords, etc., appear under their individual names, such as Kluane Lake, Nizhnyaya Tunguska (*river & basin*), Vulkan Ksudach, Cape Hope's Advance, Angmagssalik Ö, Hebron, Bol'shezemel'skaya Tundra, Klutlan Glacier, Isforden. They are indexed under their officially established name, with references to this form from any more commonly known English forms. The U.S. Board on Geographic Names and the Canadian Board on Geographical Names are cooperating with the Project to ensure that the names used are those appearing on the best maps of the area concerned. And the geographic feature headings are identified in the index with their location on a map.

Arctic enthusiasts or imaginative index readers may find unexpected delight in the columns of this index. Headings such as Airplanes' landing & takeoff, Aridity phenomena, Auroras, Buoys, Carbon monoxide poisoning, Carrier pigeons, Diet & nutrition, Dogs & dog driving, Eskimos' origin, Franklin (Sir John) Search for, Hypothetical lands, International Ice Patrol, Low temperature effects, Mines & mining, Mirages *see* Optical phenomena, Motorized equipment, Norsemen, Northern Sea Route U.S. S.R., Northwest Passage, Reindeer diseases, Stellar's sea cow, Tree line, Uranium, suggest the range of Arctic literature. With this Bibliography, arm-chair explorers may enjoy tours over the end of the earth, conducted mile by mile by guides whose feet measured those miles. For whatever is one's avocation, photography, butterflies or maps, arctic literature thus accessible opens a fresh new field. As Professor J. T. Wilson said in an early publication of the Arctic Institute, "scientific reasons for the study of polar regions have always existed." This comprehensive Bibliography gives a birds-eye view of work done, and high lights the work that remains.

ASSOCIATES OF THE ARCTIC INSTITUTE

During the formative years of the Arctic Institute many friends expressed the hope that a means of close association with its objectives might be made possible. In response to this expression the Institute has developed a membership program for Associates of the Arctic Institute. Associates will receive the journal of the Institute biannually and other reports from time to time. The chief qualification for Associate Membership is interest in Arctic work, and the Board of Governors will welcome the widest possible participation. Dues are $3.00 annually and may be paid in United States or Canadian funds and forwarded to either the New York or Montreal offices of the Institute.

SECOND (1948) U.S. NAVY ANTARCTIC DEVELOPMENT PROJECT

By **Commander David C. Nutt, USNR***

THE Second (1948) Antarctic Development Project was the second post-war U.S. Navy expedition to the Antarctic and was in reality in part a continuation of the previous year's "Operation High-Jump". The general plan of the expedition was that two "wind-class" ice-breakers should penetrate the belt of ice pack at various points along the antarctic coasts and land parties by boat, overland transport, or by aircraft to enable them to fix geographical points. In addition a program of research in the various sciences was undertaken, as well as extensive testing of naval equipment and operational procedure.

Commander G. L. Ketchum, USN, was in command of the expedition, officially known as Task Force 39. The ice-breaker U.S.S. *Edisto* (AG-89), under the command of Commander E. C. Folger, USN, departed Norfolk on 6 November 1947 and proceeded via the Panama Canal to American Samoa to join U.S.S. *Burton Island* (AG-88), commanded by Commander E. A. MacDonald, USN, and with the Task Force Commander and staff on board. Final departure for antarctic waters took place from Samoa at 0800 on 5 December and both ships headed south on parallel courses to make lines of deep sea soundings.

Ice pack entered

The antarctic ice pack was met on 15 December some 100 miles north of Scott Island and the ships skirted its edge to the westward until reaching a point near longitude 92° East, directly north of the Davis Sea. A southerly course was shaped into the pack, and soon very heavy and close-packed, but broken, ice was encountered. After three days bucking this ice an entrance was forced into Davis Sea at the unusually early date of 27 December. Davis Sea is an ocean area lying to the westward of the Shackleton Ice Shelf where, during the summer season at least, a considerable amount of open water is usually found. Here the ships parted company, the *Edisto* working in the area to the westward toward Mount Gauss, and the *Burton Island* along the western margin of the Shackleton Ice Shelf.

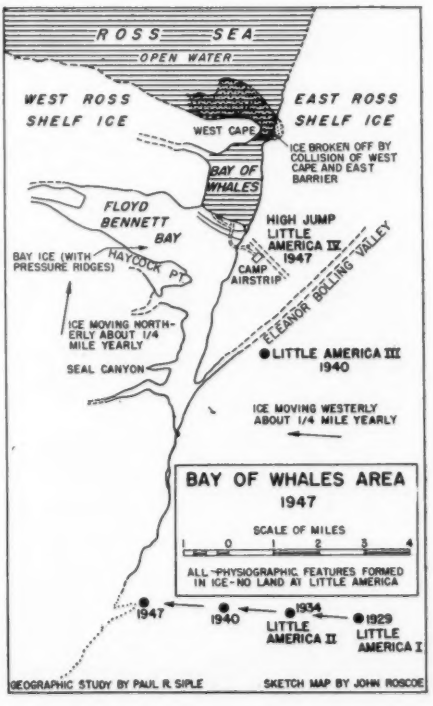
A landing was made on Haswell Island, a small island lying off the edge of the continental ice, where a large number of antarctic birds nest. It was discovered in 1912 by the western party of Sir Douglas Mawson's Australian Expedition, and is one of the few known nesting places of the Emperor Penguins. They breed during the depth of the antarctic winter laying their eggs on the sea ice near Haswell Island in temperatures of

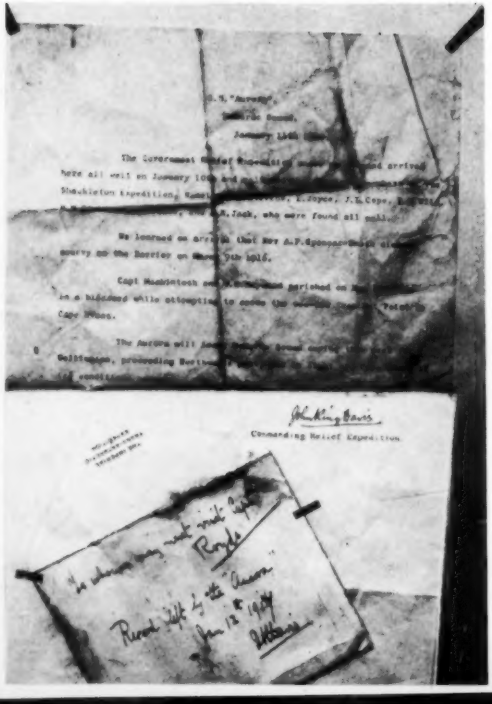
*The opinions expressed in this article are the author's and should not be construed as official Navy Department opinion.

-50° to -60° F. Ornithologists explain this seemingly odd breeding habit by the fact that the summer season is too short for the eggs to hatch and for the young of so large a bird to reach maturity. Accordingly the eggs are laid and hatched in the winter time when they can be incubated by the adults, thus allowing the young birds time to mature during the relatively mild summer that follows. It was in the Davis Sea area that a group of fine specimens of this largest penguin, which weighs from fifty to eighty pounds and stands erect to a height of from three to four feet, were captured alive under the direction of Mr. Malcolm Davis of the National Zoological Park, Washington, D.C. The crowning moment was the capture of two Emperors by helicopter on a return flight from the continent.

"*Bunger Lakes*"

The next part of the program called for an investigation of the famous "Antarctic Oasis" more commonly known as "the Bunger Lakes area" discovered on "High-Jump" in 1946-47. This was the mysterious ice-free land with open water on which a PBM flying boat had landed a little less than a year earlier. The Shackleton Ice Shelf was skirted to the eastward and for a while it appeared as if the area was completely packed with heavy and impenetrable ice. After continued reconnaissance and probing by ship and aircraft the *Edisto* on 12 January 1948 finally penetrated the pack to a low area of shelf ice some forty miles distant from the "Oasis". This was probably some of the heaviest and most difficult ice ever navigated by ship. Aircraft flights located the ice-free area but no open water at all existed this year. This illustrates how ice conditions can change from year to year in the polar regions. Helicopters from the *Burton Island* which had remained outside the pack, flew into the *Edisto* and a small air operating base was set up on the shelf ice. This was the first expedition on which helicopters were used as a primary means of air transport. They proved themselves admirably adapted to this type of operation and expeditiously transferred the exploring party to the shore forty miles away.


ROSS SEA
OPEN WATER
WEST ROSS SHELF ICE
EAST ROSS SHELF ICE
WEST CAPE
ICE BROKEN OFF BY COLLISION OF WEST CAPE AND EAST BARRIER
BAY OF WHALES
FLOYD BENNETT BAY
HIGH JUMP LITTLE AMERICA IV 1947
BAY ICE (WITH PRESSURE RIDGES)
HAYCOCK PT
CAMP AIRSTRIP
ELEANOR BOLLING VALLEY
ICE MOVING NORTHERLY ABOUT 1/4 MILE YEARLY
LITTLE AMERICA III 1940
SEAL CANYON
ICE MOVING WESTERLY ABOUT 1/4 MILE YEARLY
BAY OF WHALES AREA 1947
SCALE OF MILES
1 0 1 2 3 4
ALL PHYSIOGRAPHIC FEATURES FORMED IN ICE-NO LAND AT LITTLE AMERICA
1947
1940
1934 LITTLE AMERICA II
1929 LITTLE AMERICA I
GEOGRAPHIC STUDY BY PAUL R. SIPLE
SKETCH MAP BY JOHN ROSCOE



Top—The small ship in the distance is the Coast Guard's icebreaker, *Northwind*, breaking a passage for thin-hulled vessels, *Merrick*, *Yancey*, and *Mt. Olympus*. This photo was made from the *Northwind's* helicopter.

(U.S. Coast Guard photo)

Left—Record left by John King Davis on January 12, 1917 in Shackleton's old camp on McMurdo Sound. This was secured by U.S. Navy Project in 1948.

(U.S. Navy photo)

The ice-free area which is about sixty miles by twenty miles in extent is apparently high land which extends from a range of mountains in such a way that the continental ice flows to either side of it. The weather also seems to "flow" to either side, for perfect weather was encountered by the shore party throughout their two day visit, while virtual blizzards at times almost completely surrounded them. The ice-free area is made up of a series of islands and part of the mainland. It is best described as a desert with only scanty precipitation, as was shown by the occurrence of soluble salts on the ground, and the ponds of very brackish water. Very little life of any kind was observed. The open water encountered in 1947 was in salt water embayments and inlets, which in 1948 remained completely frozen over.

Continuing eastward on January 18th to 20th, landings for the first time were made on some unnamed islands along the Knox Coast. One of these was in an area of numerous ice-free islands where parts of the antarctic continent itself projected from its ice covering. It was one of the most attractive spots visited. A large Adelie Penguin rookery was discovered by helicopter, and mosses and lichens were observed on the islands.

Bases of earlier expeditions

On leaving this area the force skirted the outer edge of the pack ice eastward, entering the Ross Sea on 28 January 1948 after passing through no more than a few strings of scattered ice, a marked contrast to the three hundred mile battle a year before on "High-Jump". Both ships visited McMurdo Sound, the site of the heroic British efforts during the early part of this century. A helicopter party visited Cape Evans the site of Captain Scott's base. It was from there that he set out for the South Pole, only to perish on the return journey a few miles from his "One Ton Depot" on the great Ross Ice Barrier. The Sound was practically free from ice and this permitted a boat party to land at Cape Royds, the site of the 1908-09 Shackleton expedition. The hut used then is still standing, and would in an emergency be in usable condition. Sleeping bags and odd bits of equipment and material were lying about inside and outside the hut. Everything is well preserved in this climate, the main destructive force being the strong winds of winter blizzards which have torn off a corner of the roof. A keg of nails which had been dumped on the ground outside the hut showed only a few spots of rust and were as sound as the day they were unloaded from the SS *Nimrod* forty years ago! Matches were found in the hut and every one lit when it was struck.

"Little America" was then visited, and the Task Force remained in the Bay of Whales for about five days while the "operations" base set up on "High-Jump" was inspected. An interesting glaciological process was taking place right before our eyes. The entrance to the Bay of Whales is

rapidly closing. In 1948 it was little more than 100 yards wide, and will probably be closed completely within a relatively short time. It is believed that the cause of the indentation in the Ross Ice Barrier, known as the Bay of Whales, is that the shelf ice tends to flow around Roosevelt Land, which is either an island or a shoal on which the shelf grounds. As the whole front of the ice continues to move seaward, the entrance to the Bay is closing in to form an "ice-locked" basin. What will happen when the ice meets will be interesting. One possibility is that the pressure exerted by the closing of the entrance will cause a block of shelf ice to break off reopening the Bay of Whales to navigation. The next few years will unfold an interesting glaciological story.

Leaving "Little America" on 5 February the Task Force proceeded eastward, making two unsuccessful attempts to penetrate the exceedingly heavy ice to reach the coast and visiting Peter I Island in the Bellingshausen Sea briefly.

The last area visited was the magnificently scenic Marguerite Bay where contact was made with the Finn Ronne Expedition based at Stonnington Island, the site of the U.S. Antarctic Service eastern base during 1940 and 1941. After making brief investigations in this area and assisting the Ronne vessel to break out of the ice, the two ships of the Task Force in company with Ronne's *Port of Beaumont* left the Antarctic for home on the evening of 23 February 1948. The *Burton Island* proceeded to her home port on the United States west coast while the *Edisto* returned to the east coast, both to fit out for summer arctic operations. The Second (1948) Antarctic Development Project was a very interesting and worthwhile operation. The ice-breakers proved themselves capable and efficient ships for the work. Without them penetration to the antarctic coasts would have been long delayed, if not altogether impossible.

USS *Edisto* (AG-88) and USS *Burton Island* (AG-89) moored to bay ice, Bay of Whales. Sled and skis used in surface exploration are in left foreground. *(U.S. Navy photo)*

THE VEGETATION AND LIFE ZONES OF GEORGE RIVER, EASTERN UNGAVA AND THE WELFARE OF THE NATIVES

(A PRELIMINARY NOTE)

By **Jacques Rousseau**

For more than 300 miles, the George River, between the Province of Quebec and Labrador, flows from the height of land, north of Lake Michikamau, to Ungava Bay. Ranging from half a mile to a mile in width and at times enlarging into lakes three to five miles wide, its water supply is very high.

We would logically conclude that so big a river would at least be well-known to Indian hunters. However they seldom, if ever, travel it from source to mouth or vice versa because of the incline of the river. There are only a couple of falls and, the lakes excepted, it is a succession of lengthy rapids, sometimes five miles long and all linked by swift waters. From Indian House Lake to the sea, over a distance of approximately one hundred miles, the river drops about one thousand feet and might well be considered as a more or less continuous series of rapids. For this reason, the Barren Ground band, which once inhabited the region of Indian House, knew but a section of the river, travelling mainly laterally to Fort Chimo or the Labrador coast. The first person to cover the river completely was, apparently Mrs. Leonidas Hubbard in 1905. Later came Dillon Wallace. Mrs. Hubbard has given us a good map and an interesting account[1] in which may be found a very good description of the territory. After this trip, forty-two years elapsed before others travelled down the river from its very source. The trip made by our party in the 1947 summer was the first biological (and also geological) survey of the river.

Arctic and Subarctic Zone

The plateau, at the height of land, is covered by the taiga or subarctic forest, consisting mainly of black spruce, tamarack and occasionally white spruce and balsam fir, with a carpet of *Cladonia alpestris* and *C. rangiferina* and several ericaceous plants. But, beyond 55° lat. N., trees become restricted to river valleys and occupy often less than five per cent of the whole territory.

The limit of the arctic zone, considered from the plant life point of view, is generally placed between the 58th and 60th parallels in Quebec, because old explorers such as Low (who had not travelled the George river but the Kaniapiskau and Koksoak), mentioned or brought back some fragments of trees. The herbarium specimens in existence and such brief descriptions are responsible for the present interpretation. It is unwise to accept the absolute limit of trees as the limit of the Arctic vegetation zone. One drawback in doing so is that such an assumption is not in accordance with actual fact.

Between 55° lat. N., and approximately the parallel of 59°, except for some small thickets at the bottom of valleys or occasionally on favourably exposed slopes, the territory belongs more appropriately to the arctic barrens, the dry tundra consisting of *Arctous Alpina, Empetrum nigrum, Ledum palustre, Salix herbacea, Salix uva-ursi, Diapensia lapponica, Cladonia alpestris* and other lichens, etc. It is also worthwhile noticing that arctic conditions are more typical inland between 56° N., and 57° N., than between 57° 30′ and 58°. As, north of the 57° the river descends a slope of about one thousand feet within less than one hundred miles, the decrease in altitude apparently compensates for the increase in latitude; the climate is milder and consequently the forest thickets are denser, although never the continuous subarctic forest.

North of the 55° lat. N., on either side of the George river, the continuous subarctic forest zone (only bare of trees in peat-bogs, lakes and occasionally on rather abrupt rocky exposures) is succeeded within approximately 10′ of latitude (approximately 12 miles), with practically no transition, by the aforesaid arctic formation. This zone, situated between 55° and 59° offers more or less a parallel case with that of the mixed forest lying between the deciduous woods and the coniferous forest.

The succession of plant life zones in the north (at least in the George river district) should be summarized as follows: 1) The subarctic forest extending north to the 55th parallel. 2) The first section of the arctic zone with small "islands" of subarctic forests (rarely more than 5 p.c. to 10 p.c. of the area), between 55° N. and approximately 59° N. 3)The second section of the arctic zone, north of the absolute limit of trees (north of 59° N.) with no trace of "islands" of subarctic forests. I am under the impression that this new zonation of plant life coincides closely with climate zones.

Flora in relation to glaciation

Another observation noted on the 1947 botanical survey of the George river, and which will probably influence our knowledge of north-eastern biogeography, is the occurrence on the inland plateau, of a great number of species found in the Gaspé region which had heretofore been considered by some botanists as indicators of nunataks. As the Arctic Archipelago is also supposed to have been unglaciated during the recent glacial period, there has been no real botanical evidence opposing the Gaspé nunatak theory. There is such a thing as a nunatak and a preglacial relic, but the question which arises is, "Was the Gaspé peninsula unglaciated?" Evidence in favour of Gaspé non-glaciation may appear feeble, but no attempt to date to overthrow the hypothesis or even to weaken it purely on a basis of biogeographical studies has succeeded.

That the George river district was glaciated there need be no doubt if such a phenomenon as a continental glacier ever existed, not only because

the district is near the centre of the Labradorian glacier, as based on Low's preliminary reconnaissance, but on evidence of the occurrence of moraines themselves. The whole territory is a gigantic moraine, more or less, and even the highest summits (about 1800 feet high) are covered with huge granitic boulders of sub-recent origin. If they were polished in transportation they are not weathered as they would be had they been deposited during some previous and more ancient glaciation. Consequently, none of the plants found in the George river district can be used as indicators of an unglaciated area. The list of plants of supposedly unglaciated areas will thus be reduced so that the hypothesis of a Gaspé nunatak will need evidence from outside the botanical field to remain a living hypothesis[2]. We do not presume that the associations of the George river district are proof that the Gaspé district has not been glaciated, but discovery on the George of many of the elements of this Gaspésian flora eliminates many of them considered heretofore as a proof of non-glaciation.

Man and animal life

The George river was, at one time, the realm of the caribou. Herds containing thousands of head met there at the season's end after having grazed unmolested on the lichen-covered hills, during the summer months. Herds are now reduced to only a few heads. Intensive hunting, if illness is not considered, is responsible for the decrease. Food is not a factor because the vegetation of the plateau and the hills would be sufficient for grazing thousands of animals. Unfortunately, in the old days (and until but a few years ago) the inland Naskapi and the Labrador hunters, white, Naskapi or Eskimo, each year wiped out entire herds. When they found the caribou, the natives slaughtered them mercilessly, keeping for themselves sometimes only the marrow, some of the skins and the tongues which they sold later on reaching the coast.

A group of Naskapi, the Barren Ground band, formerly occupied the long Indian House lake, a widening in the George river. When Mrs. Hubbard passed through the territory in 1905, there were about thirty families camping at the southern end of the lake. When Cabot arrived there from the Labrador coast in 1910, they had moved a few miles northward. During my trip during the 1947 summer, ethnological studies (I would prefer to say archaeological studies) permitted me to follow the migration of the band towards the north for about one hundred miles. During the migration, spaced over approximately forty years, the Indians had gradually and consistently modified their living conditions, abandoning the skin tent for the canvas and the primitive fire place for the light camp stove. In the meantime, they became fewer. The tent sites, about thirty at the spot where Mrs. Hubbard met them in 1905, dwindled to only five or six when the natives established themselves less than a decade ago at the northern end of their run. No Indians now inhabit the territory

and the last hunters withdrew three years ago. The remnants of the Barren Ground people, no doubt joined the Fort MacKenzie Indians or the other bands inhabiting the Labrador coast.

From a human point of view, the George river basin, covering 30,000 square miles, is a desert which Indians prefer avoiding because of the scarcity of food. It is a common saying among them that to winter over in the basin without being fully supplied means death.

I am nevertheless convinced that the territory could eventually be made into an important "reservoir" of game for an extensive native population. Caribou would increase at a rapid rate if fully protected on account of the ample plant food supply. Nevertheless, if the protection were to consist only of the restriction of hunting over a specified period, the results would be rather poor. How can we prevent the natives hunting the caribou when it is one of their basic requirements? Even if the George river district were closed to hunters, (which is in fact the present situation), no good would result, as the caribou, a migratory animal, would not be adequately protected along the inhabited Labrador coast. The slaughtering of caribou on the coast contributed more to the fantastic decrease in number than the inland hunting of the few dozen Indian families.

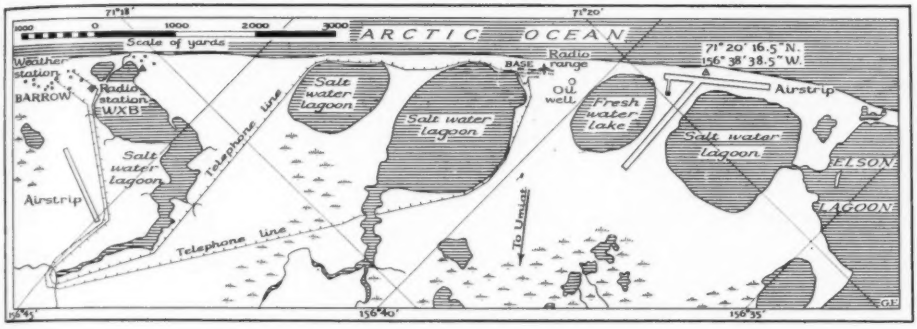
Introduction of Reindeer and Mountain Goats

Better than direct relief, which would soon lead the native to rely solely on government help, would be the introduction of another animal as a substitute. Two solutions, one as good as the other, may be considered; the reindeer and the rocky mountain goat. The George river territory can accommodate large reindeer herds sufficient for a large population, provided skilled herdsmen are hired to train the local inhabitants. The introduction of mountain goats will be simpler for as soon as they are introduced into the territory, they will immediately choose those parts of the territory which are of little use to the caribou or the reindeer. One animal consequently will not compete with the other. The northern part of the George river district is very hilly and is particularly suited to goats.

I do not hesitate to recommend to the Canadian federal authorities the introduction of reindeer herds under the supervision of trained native herders. As for the introduction of mountain goats and the proper protection of the caribou, only a joint program under which both Quebec and Newfoundland share the expense proportionally to the number of inhabitants of the territory, will succeed in establishing the game in an immense territory and save the native population from starvation or expensive direct relief.

[1]Hubbard, Mrs. Leonidas. *A woman's way through unknown Labrador.* An account of the exploration of the Nascaupee and George rivers. Toronto, (William Briggs) 338 pp. one map, numerous illustrations, 1908.

[2]I can only touch these problems summarily here. They will be discussed at greater length in a forthcoming technical paper.



THE HISTORY OF THE ARCTIC RESEARCH LABORATORY

(UNDER CONTRACT WITH OFFICE OF NAVAL RESEARCH)

POINT BARROW, ALASKA

By* M. C. Shelesnyak, Office of Naval Research, Navy Department

THE Arctic Research Laboratory under contract with Office of Naval Research, Point Barrow, Alaska, is a frontier field establishment for basic scientific investigations of physical and biological phenomena related to the arctic environment (1) (2).

The story of the Arctic Research Laboratory (ARL), opens on August 13, 1946 when Vice-Admiral Harold G. Bowen, USN (Ret), Chief, Naval Research, addressed a letter to all bureaus and offices in the U.S. Navy Department. In this letter he invited comment regarding the proposed establishment of a research laboratory in the arctic, at Point Barrow, Alaska, where civilian scientists from Universities, research institutions and government departments could conduct basic studies on arctic problems. Enthusiastic support for the proposal was expressed in all the replies received.

In conformity with the usual policy of the Office of Naval Research the advice of scientists and arctic specialists was then sought. Comments by Sir Hubert Wilkins included: "The information that the Office of Naval Research is effecting research and development in various fields of basic science by contractual agreements with various civilian agencies as well as within Naval Laboratories is most encouraging and will certainly lead to results of high value . . . . the initiation of a service laboratory and field research should not be delayed, since there are specific service problems in physiology, environmental protection and geophysics which must be solved as early as possible . . . . "

The Executive Director of the Arctic Institute of North America, Dr. Lincoln Washburn, wrote:

"Your letter of September 24th outlines work of the greatest value to arctic research and I am pleased indeed to have this opportunity to follow your suggestion and comment on the proposed program. An arctic field laboratory for the pursuit of basic scientific research is one of the best ways to facilitate the acquirement of new information. It affords a base of operations for scientists, encourages cooperative observations in different fields of science, and is the only means of effecting some types of research requiring frequent observations at fixed points over a period of years . . . . The Arctic Institute is keenly interested in all fields of endeavor outlined in your letter and will be glad to cooperate in every way it can."

Among other scientists whose opinion was solicited and who expressed keen interest in the proposal to establish an Arctic research laboratory, were Dr. Harald U. Sverdrup, polar explorer, formerly Director of Scripps Oceanographic Institution, Dr. Paul Siple, Geographer, U.S. War Department General Staff (now Department of the Army), Dr. Laurence Gould, President, Carleton College and Geologist to the Byrd Antarctic Expedition, and Dr. H. B. Collins, Jr., Ethnographer, Smithsonian Institution.

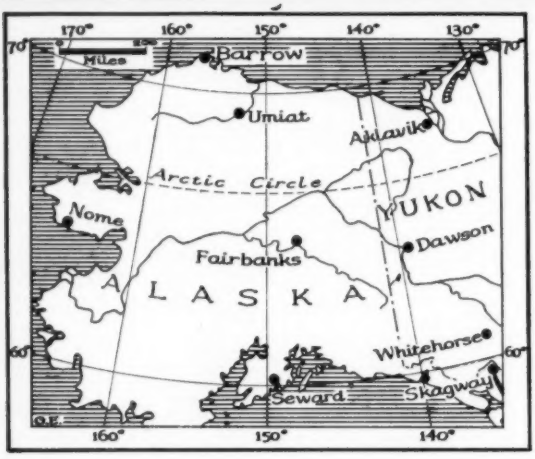
It may be worthwhile to state here the principles which govern the relationship of the research program of O.N.R. to civilian institutions and Navy laboratories. The main principle is that research contracts should be "partnership agreements" with scientists, to give them the maximum freedom in carrying out their work.

> "Certain basic principles have evolved from the study of the research program during the period which has elapsed since establishment of this Office. The principles are:
>
> "*Diversification and competition* make a more varied attack, stimulate research as well as industry and produce better results. Unintentional duplication is inexcusable, diverse and even parallel work has proved wise and economical provided that those doing the parallel research are aware of each other's work.
>
> "*Freedom from security classification* in fundamental research is essential to its quality and progress. As soon as fundamental work points to applications that should be classified, these lines may be detached from the main body and dealt with under appropriate security rules, but it should be remembered that secret work is costly in time and money and is often of secondary quality.
>
> "*The stimulation of research within navy laboratories* is a basic 'must' in research establishments under the administrative supervision of the Office of Naval Research and is constantly advocated in all naval research activities under the control of other agencies.
>
> "*Collaboration with civilian scientists* is desired. This office is negotiating contracts with industry, private research institutions, and universities, for basic research and for consulting services. Research contracts are in the

Newly modified two-storey laboratory building at Point Barrow photographed in July 1948.

Prof. John Field of the Department of Physiology, Stanford University, presenting the first seminar at the Arctic Research Laboratory.

Dr. Laurence Irving, Scientific Director Arctic Research Laboratory, and Dr. Walter Flagg of Swarthmore College, carrying on research at Point Barrow, Alaska.



nature of partnership agreements, and offer the scientist freedom to initiate, explore, teach, and publish in carrying out basic research for the Navy under the contract. It is believed that this procedure is one mutually beneficial to the civilian scientific fraternity and to the Navy, encouraging the scientist to conduct research in an atmosphere of scientific freedom and at the same time assuring the Navy that new knowledge is being created from which developments may later come to strengthen Naval power."[3]

Thus, the basic charter and the guiding principles of the Office of Naval Research afford one of the keys to the role of ONR initiative in the Arctic Research Laboratory. A second key, the U.S. Navy's historic interest in Arctic exploration has been discussed by various writers (4) (5). A third key is related to the present status of field research, especially in the Arctic. Information gathered in the past century was chiefly by the toil of individuals or small expeditions which were limited in both logistic support and finances. Today, due to advances in the technology of modern scientific research, full financial and logistic support are needed if the highly specialized techniques are to achieve the greatest benefits. Moreover, the accumulation of systematically collected data requires long-term studies at fixed or semi-fixed bases. (6)

Returning to the immediate history of the ARL, the matter of site and physical (logistic) support of the station presents itself. The choice of Point Barrow, Alaska, was based on many considerations: it is the most northerly United States settlement in North America; a typical arctic coastal region; the historic role of Point Barrow in American arctic exploration both scientific and commercial and the existence of Naval Petroleum Reserve No. 4.

Naval Petroleum Reserve No. 4 is a 35,000 square mile area in northern Alaska set aside by President Harding in 1923. It extends from Icy Cape on the west to the mouth of the Colville River on the east. South and east it is bounded by the Colville to where it is joined by the Etviluk, then due southward about thirty miles. The boundary then runs westward to approximately 160° 45′ Long. then due north to Icy Cape.

In 1944 plans were made to carry on petroleum exploration. The job was given to the "Seabees" (Construction Battalions) of the Bureau of Yards and Docks, U.S.N. and work was underway at Point Barrow by January, 1945. After V-J day, the task was turned over to the Director of Naval Petroleum Reserves, Commo. W. G. Greenman, USN. Two

recent series of articles (7) (8) describing the remarkable activities of this group, are highly recommended to students of the Arctic.

Plans for a science laboratory at Point Barrow were discussed with Commo. Greenman early in the fall of 1946. His enthusiastic support and that of Cdr. P. W. Roberts (CEC) USN, at that time civil engineer in charge of construction at the Reserve greatly eased the problems of laboratory housing, boarding and housing of personnel, and local travel. The continuing interest and support of Naval authorities at Point Barrow has contributed to whatever success the arctic research program may have achieved.

During February 1947, the writer, representing the Chief of Naval Research, made a reconnaissance visit to Point Barrow to study the feasibility of the proposed program. The highly mechanized nature of Point Barrow Camp, the technical activities going on there and the interest of the petroleum personnel in research combined with their successful operational experience increased the planners' enthusiasm.

The second stage in development of the project began on August 6, 1947, when a scientific party of five men from Swarthmore College, under the leadership of Prof. Laurence Irving, with two men from Cornell University, arrived to begin a one year program of metabolic studies in arctic climates. (9)

Although no laboratory was yet ready for use, since part of the group's purpose was to establish the necessary facilities, research had begun within a fortnight. A 20′ x 40′ quonset hut was remodeled as a physiological laboratory. The addition of equipment, supplies, animal quarters and temperature control chambers made a small but satisfactory working quarters.

In view of the great amount of research in Arctic problems waiting to be done (10) (11) (12), and the opportunities available at Point Barrow, plans were undertaken in the fall of 1947 to expand the laboratory accommodation the following year.

In February 1948, the Chief of Naval Research appointed Dr. Laurence Irving as Scientific Director of the Arctic Research Laboratory in addition to his duties as principal investigator on the Swarthmore College research contract. He was to be responsible for co-ordinating the various projects assigned to the laboratory. To provide advice and guidance to the scientific officer responsible and to the Scientific Director Rear Admiral Lee invited a group of leading scientists to form the Arctic Research Laboratory Advisory Board (ARLAB). The first meeting of this group was held on 15 March 1948. The members are:—

Commo. W. G. Greenman (USN), Director Naval Petroleum Reserves

Laurence Irving, Scientific Director Arctic Research Laboratory

Ellis A. Johnson, Johns Hopkins University
Remington Kellog, United States National Museum
Roger Revelle, Scripps Oceanographic Institution
J. Frank Schairer, Carnegie Institution of Washington
Alexander Wetmore, Smithsonian Institution
John Reed, United States Geological Survey (Chairman)
M. C. Shelesnyak, Office of Naval Research (Executive Secretary)
Mrs. Yvonne Reamy (Administrative Assistant to the Executive Secretary)

Following the second meeting of the Board recommendations regarding the Board itself, the policy and program of the Arctic Research Laboratory, and the duties of the Scientific Director were made to the Chief of Naval Research and were approved by him.

They included the following:—

"The Advisory Board recognizes as its principal function the stimulation and promotion of basic scientific research under the auspices of the Arctic Research Laboratory (under contract with ONR) at Point Barrow, Alaska, in the interests of national security, and the recommendation of programs to the Chief of Naval Research: furthermore, the Board will study and advise the Chief of Naval Research on such scientific problems as he may present to it."

Furthermore, in reference to ARLAB duties and functions, the following has been considered and accepted:

A. *Duties*

(1) Individually and collectively to make available to appropriate persons or institutions, including Federal agencies, information as to the facilities of the ARL and methods by which projects can be proposed and approved;

(2) To study and appraise the value and relative priority of programs for scientific research projects submitted to it for consideration as projects to be carried out at the ARL;

(3) To keep itself informed of the progress of approved research projects and of their accomplishment in terms of the original project;

(4) To facilitate the critical examination and appraisal of reports growing out of research projects and to make recommendations regarding subsequent publication and classification; and

(5) To review and advise on the policies and practices of the ARL of the Office of Naval Research at Point Barrow, Alaska.

Staff of the Arctic Research Laboratory, Point Barrow, Alaska, photographed in July, 1948.

B. *Procedure*

It is anticipated that proposals for research activities at the ARL will be made to the ONR. After general review by the ONR as to appropriateness and necessary details and after the Scientific Director of ARL, having received copies of the proposals, has had an opportunity to comment, the proposals will be referred to the ARLAB. The ARLAB will consider such proposals and advise as to their intrinsic worth as well as to their priority in relation to other proposals. The ARLAB will then promptly submit to the ONR a recommendation for approval or disapproval of the project. When these recommendations are forwarded to the ONR, a copy will simultaneously be sent to the Scientific Director of the ARL so that his comments may be received by the ONR before final decision. The appraisal of the practicability of all projects will be by joint agreement between the Scientific Director of the ARL and of the Officer in charge of Construction NOy-13360, Fairbanks, Alaska.

In view of the unique conditions at the ARL, it is further anticipated that many of the projects as originally submitted will not contain sufficient detail as to cost, timing, equipment needs and other items that will be necessary before final recommendation is made; therefore, the ARLAB proposes to draft a list of the various informational items that should be supplied before detailed consideration is given any proposed project.

The basic policy of the ARL was reviewed and restated as:

A. To provide facilities at Point Barrow for fundamental research in all appropriate scientific fields related to the arctic environment and

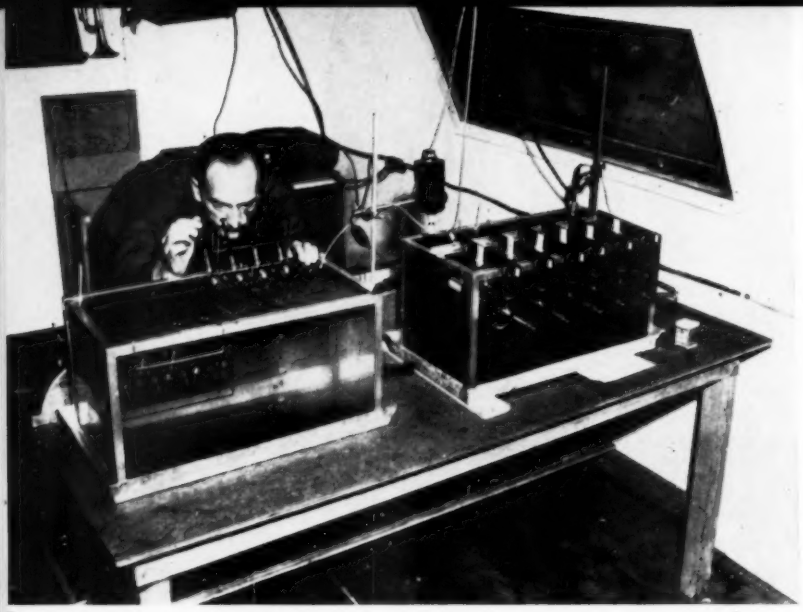
B. To afford facilities within the laboratory and also facilities as a base for field studies in arctic Alaska.

It is expected that the programs will be largely initiated by competent groups in and out of the Government and that some will be supported by the ONR and some by others.

In preparation for an expanding program, the plans for enlarged quarters initiated in the fall of 1947 were achieved late in the spring of 1948 and a second building was ready by July, 1948. A two-story 40′ x 100′ quonset hut, with laboratories and workshop on the ground floor, and library, storeroom, seminar room and office on the second floor is now (August 1948) in operation. In addition, the original small building is in use by the Swarthmore group. By mid-summer 1948, about thirty scientists and technicians were engaged at the ARL in research related to the Arctic.

The research work carried on under ARL contract between ONR

This laboratory at Point Barrow is used for studying native food as part of the office of Naval Research project.



Dr. Reida Wennesland of Swarthmore College making metabolic measurements of some local marine fauna at Point Barrow, Alaska.

and various universities includes the following:

Swarthmore College studies, under direction of Prof. Laurence Irving, with a staff including Drs. Per F. Scholander, Reidar Wennesland, Harold Eriksen, Gyrd Eriksen, W. Flagg, Eminger Steward, V. Walters and John Andrews are concerned with metabolic activity of arctic life. Field surveys in search of animals for experiments have been carried on by this group.

Drs. Donald Griffin, Raymond Hock, F. Johnson, and M. Karplus of Cornell University have done research on the physiology of bird navigation and migration. The Point Barrow region is, of course, an exceptionally good place to study the movement of birds such as Golden Plover, King Eider and others.

A study of marine fauna in the Point Barrow area is being carried out by Dr. George MacGinitie, Director of the Kerchoff Biological Laboratories, California Institute of Technology. He is being assisted by Nettie MacGinitie and David McNutt. Another group from California Institute of Technology under Prof. Dan Campbell is planning studies of immunochemical aspects of arctic animals.

Small la
Arctic
ratory,
during
winter.

Prof. John Field, from the Department of Physiology, Stanford University, assisted by Dr. Clarence Peiss, is studying tissue metabolism of arctic animals.

Dr. Victor Levine, a veteran of arctic medical research, is leading a group from Creighton Medical School which is doing vitamin content assays of arctic flora and fauna, and health studies of the Point Barrow natives. Carl T. Henkelman, D.D.S., is a member of this group and is making a thorough dental study, including denture casts, of several hundred Eskimos.

Several scientists receiving grants-in-aid from the Arctic Institute of North America are doing their research at the ARL, or are working out of Point Barrow in the area north of the Brooks Range. The former include Prof. Charles Wilber and X. J. Musacchia of Fordham University who are analyzing blood and tissue of arctic animals for fat content, and Prof. Irwin Newell of University of Oregon who is making a comparative study of mite fauna. Dr. R. D. Hamilton, University of Michigan is carrying on a zoogeography of *Rana Sylvatica*, and Lloyd Spetzman, University of Minnesota is studying some ecologic aspects of lichens in the Umiat region.

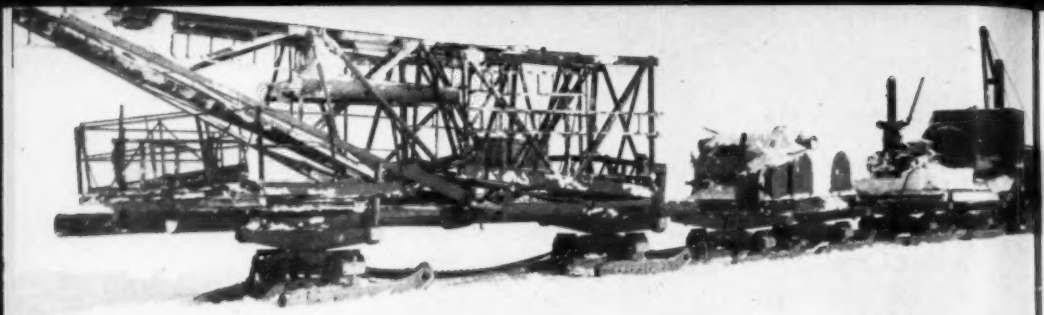
Some preliminary research on geophysical problems of the area are being carried out by M. B. Dobrin and R. R. Van Zant of the Naval Ordnance Laboratory.

Plans are in hand for expansion of the research in physical and geophysical fields, including oceanography, meteorology and magnetic and cosmic radiation. It is intended that when the programme is complete about two thirds of it will cover research in physical problems and one third in biology.

During a recent visit to the laboratory by the writer, the first of a series of weekly seminars was held. Prof. John Field discussed "The analysis of metabolic adaptation to temperature in arctic Poikilotherms by means of dinitrophenol". A second seminar on "General problems among the Eskimos with special reference to the health situation" was presented to Dr. Victor E. Levine. By good fortune, the Captain of the U.S.C.G. icebreaker *Northwind* visited the laboratory and was kind enough to give the third seminar on "Ice conditions in northern polar waters". It is hoped that material presented at the seminars will be compiled and published.

One aspect of the Arctic Research Laboratory which warrants special

Small laboratory at the Arctic Research Laboratory, Point Barrow, during the 1947-48 winter.



Point Barrow, site of the Arctic Research Laboratory, is the base for supplying oil-exploring parties in the interior of Alaska. The equipment shown here was hauled 331 miles from Barrow to Umiat. *(U.S. Navy photo)*

comment is the library. The value of an adequate library to any laboratory is obvious but for a field research laboratory it is sheer necessity. To meet this need the largest part of the second floor of the new 40′ x 100′ building has been used. At present, most of the material consists of general scientific handbooks, guide books, basic texts and references. Plans include provision of an adequate arctic section, especially with reference to the local area. Friends and interested persons have already contributed liberally by giving books and journals, and further gifts will be most welcome.

It is hoped that the Arctic Research Laboratory will eventually become an outstanding centre for basic scientific research in the North American Arctic. The Office of Naval Research is well aware of the need of cooperation from scientists if this hope is to become a reality.

*The opinions expressed in this article are the author's and should not be construed as official Navy Department opinion.

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PROJECT "SNOW CORNICE"

The Establishment of the Seward Glacial Research Station

By Walter A. Wood, Arctic Institute of North America

Introduction

DURING the discussions of those who envisioned an Arctic Institute of North America, the subject of field research assumed its rightful place as the essential ingredient in our recipe for an ever widening knowledge of polar characteristics. Feeling was strong, however, that attainment of such knowledge might best be achieved through the establishment of facilities at which cooperative studies could be carried on in as many fields of interest as the localities selected might afford. Thus, in effect, the efficient study of the environmental elements of a region could be undertaken on a planned basis and the indefinite overlapping margins of allied scientific fields fused. Project "Snow Cornice" proposed to put such a cooperative program into effect.

The area of operations embraced by "Snow Cornice" can be described as the drainage basin of the Seward Glacier together with its only distributary, the Malaspina Glacier. This area is traversed by the international boundary between Alaska and Yukon Territory and, consistent with the North American character of the Institute, personnel representing institutions of both Canada and the United States participated in the project.[1]

For many years work in the fields of snow mechanics and glacier regimen has been pursued with increasing intensity by European scientists employing as laboratories the easily accessible ice streams of the Alps and the more remote glaciers of Iceland and Spitsbergen. Yet in North America interest has been centered in observational comparison of the terminal positions of a few active glaciers, with but scattered examples of detailed and more fundamental studies. In fact it is difficult to recall a single example of studies carried out in North America and devoted to the great areas of snow accumulation. "Snow Cornice" provided an opportunity to initiate such studies.

Certainly a past deterrent to glacier regimen studies has been the inaccessibility of the areas at which significant studies could be made; in planning "Snow Cornice" it was felt that through the application of airborne techniques a solution to this problem would be found. For the safe operation of aircraft a landing area providing unobstructed approaches, absence of crevasses and an even surface is essential. The broad expanse of the Seward Glacier basin (roughly 750 sq. miles) amply fulfills these requirements; and when it is considered that such a site lies only 55 airline miles from the excellent airhead facilities at Yakutat, Alaska, the final piece in the jig-saw puzzle of selection-accessibility was provided. Furthermore the Seward is contained within a very extensive and well defined

basin whose only drainage channel is the very narrow (3½ miles) outlet to the broad Malaspina piedmont. Thus the Seward Basin provides a vast unit whose physical properties, for glaciological purposes, can be accurately defined. In selecting the Seward Basin for glaciological research the merits of the area for meteorological and biological studies also were weighed as was the opportunity for studying techniques of travel and of living.

Specifically, "Snow Cornice" proposed to effect the following:

a) The establishment of a semi-permanent research station within the confines of the Seward Basin.
b) The initiation of a long-range glaciological program.
c) The exploration of the geological structure of the region.
d) The accumulation of standard meteorological data.
e) A reconnaissance of the biology of the region.
f) Studies and experiments contributing to expeditionary efficiency.

The personnel comprising "Snow Cornice" assembled at Yakutat, Alaska, late in June 1948 where, through the unbounded cooperation of the Civil Aeronautics Administration complement, organizational headquarters were provided at the airport. The project was entirely dependent upon airborne operations and on June 30 the Institute's "Norseman" aircraft, equipped with combination ski-wheels for operations on snow and on surfaced runways, made its first landing on the Seward Glacier (5700 feet). Here a temporary camp was established from which reconnaissance towards a site for the fixed installation could be conducted. During the following ten days a satisfactory station site was selected on the corniced rock crest of a nunatak beneath the towering cliffs of Mt. Vancouver

The Arctic Institute's Norseman on the Seward Glacier (5700 ft.) 9 July 1948. All Snow Cornice personnel and equipment were transported to the glacier landing strip and the project was completely maintained by this plane. In foreground is U.S. Forest Service type radio in operation.

(15,720 feet), and to this spot were transported the expedition personnel together with approximately four tons of equipment and supplies. Of this quantity more than half was dropped from the "Norseman", either free or by parachute. During the entire season no instance of parachute failure was experienced and free drop damage was limited to less than 5% of the quantities so delivered. The housing for the research station, a Jamesway hut 16 x 24 feet in floor area, was flown in 45 packages to the glacier landing strip, man hauled 2½ miles, and erected on the nunatak. This structure, weighing 3400 lbs., was used as living quarters and laboratory for an average of seven men and proved successful in every respect. Perhaps the best criterion of its value was the universal opinion of those who labored it into a finished unit that it was worth every ounce of the energy expended in its construction.

During the months of July and August those responsible for the various phases of the project pursued their investigations. Their activities ranged from static studies of surface phenomena to protracted sledge journeys over the eastern third of the Seward Basin; from 80-90 feet below the surface in crevasses to 13,500 feet on the great north ridge of Mt. Vancouver. The scientific harvest still reposing within the pages of field notebooks and on the undeveloped emulsions of photographic plates will be reported on later. At this time it is possible to draw only broad conclusions from the first field season.

Scientific Program

The glaciological and geological program was developed and carried out by Prof. R. P. Sharp, California Institute of Technology, assisted by Leighton, Miller, Rigsby and Steenson. Collaborating with Sharp were two groups representing the National Research Council of Canada and composed of Baird, Bruce-Robertson and Salt; and Northwood, Simpson and Potter.

Due to unavoidable delays it was possible to commence studies of thermal regimen only in mid-July. Borings sunk by electrically heated hot points to a depth of 204 feet in the firn and to which thermohms and wheatstone bridge were applied resulted in temperatures of O°C. at all levels. By this early date then, the winter cold wave had been completely dissipated from the firn. In a pit dug to a depth of 50 feet, densities increased regularly (excluding ice bands) from ±0.50 near the surface to 0.85 at 50 feet. Blue ice band densities approximated 0.90. It is interesting to note the abnormally high surface density of 0.50 which demonstrates that in mid-July all accumulated snow has been converted to firn.

One of the most striking features of the Seward Ice Field in summer is the amount of meltwater circulating through the firn. At times specific layers produced several hundred cubic centimeters of water per meltwater pan, 1,437 sq. cm. in area. Crevasses in the central portion of the ice

Looking South to Mt. Cook (13760 ft.) from the snow ridge of "Indian Head Nunatak". Tracks in the foreground lead to the rocks on which the Research Station (6100 ft.) was constructed.

field were filled with water at depths between 60-70 feet. Thermal drilling also suggested that the firn was saturated at about 65 feet and this condition raises the interesting possibility of a "ground water" table at this depth which may not freeze in winter. Typical blue ice bands were common in the firn, but more impressive were nearly vertical columns of coarsely crystalline ice called "firn pipes". Recognizable as bumps or pimples on the surface, the pipes end at a blue ice band or serve to connect two such bands. They are probably old meltwater channels but they may also be formed by vapor exuded from the firn.

The excess of accumulation over ablation for the year 1946-47 was 17.5-17.9 inches of water, provided dirt layers observed in the central part of the ice field mark the summers of 1946 and 1947 as is believed to be the case. Since wastage appeared to have ceased in late August 1948, the net accumulation for 1947-48 is somewhat higher; 22-23 inches of water. Ablation approximated 16 inches of firn (density ,0.50) per month during mid-summer.

Initial results from radar soundings were encouraging. Many echoes were obtained, presumably from ice bands and other irregularities, but a distinctive echo appeared to record the rock floor. A profile across a small valley glacier was obtained but, unfortunately, it was impossible to check its accuracy by other geophysical means. The seismic and accoustical programs, on the other hand, yielded less satisfactory results due to the difficulty of projecting sufficient energy into the firn, although some hopeful results were achieved by accoustical methods to a depth of 200 feet.

Geological reconnaissance showed the predominating bedrock to be an igneous-metamorphic complex. Although complicated and of considerable lithologic variety, the metamorphic rocks can be divided into several

mappable units. A fossiliferous quartzite-limestone series was also discovered whose approximate age should be determinable from the fossils collected.

An extensive collection of flowering plants, shrubs, mosses, lichens and grasses was made for future examination and identification. All outcrops visited showed roughly similar plant life which, due to environmental differences, varied significantly in respect to date of bloom. Botanical specimens were collected at altitudes ranging from 5700 to 9000 feet by John Ross with the assistance of other members of the expedition.

Rock rabbits inhabited all nunataks visited and were the only permanent residents observed. It is intriguing to speculate on how these small animals came to their present abode since rock outcrops were in all instances isolated from the coastal fringe by 20-30 miles of glacier surface.

Birds were commonly observed, the most striking visitors being humming birds which were seen on numerous occasions at the research station. Numerous winter wrens were seen as were several members of the warbler family. No predatory birds were reported. Unfortunately each cold snap brought its toll of casualties and dead birds were frequently found sheltered under expedition equipment. A migratory tendency from the Pacific coast to the Yukon plateau seems probable in view of the general northerly direction of flight across the Seward-Hubbard Glacier divide.

The United States Weather Bureau and the Dominion Meteorological Service provided standard instruments for the collection of weather data. Standard observations made thrice daily by Ross, P. Wood and Hall were communicated to the first order U.S. Weather Bureau stations at Anchorage and Juneau for incorporation in marine and general weather forecast data. Summer temperatures were found to be higher than the altitude (6000 feet) and the glacier environment had led us to expect they would be. At the research station the mean maximum temperature for July was 50° F. While the mean minimum for the same period was 32° F. July provided 9 clear days, 8 cloudy days, and 14 overcast days. Precipitation fell on 8 days in July mostly in the form of rain, and to a total water equivalent of 2.04 inches. These data are believed to be generally applicable to the basin as a whole with the exception of temperatures which averaged 6°-10° F. lower for equal elevation at points on the glacier remote from rock surfaces. For example, minimum temperatures at the glacier airstrip 350 feet lower and 2½ miles from the research station were found to be as much as 15° F. lower than those observed at the station. Of special interest is the discovery of an apparent climatic frontier constituted by the low rock ridge which separates the Seward and Hubbard glacier systems. On repeated occasions the weather was noted to be sharply divergent on opposite sides of this ridge, the Hubbard sector giving an impression of semi-aridity as compared with the moist and heavily snow-

covered topography constituting the Seward sector.

Mapping operations, which were conducted by W. A. Wood with the assistance of McCarter and Ross, were divided into two categories; the establishment of local ground control and ground stereo-photogrammetric survey. The proximity of the United States-Canada International Boundary Survey provided a wide selection of fixed points from which a local network could be established. Stereo-photogrammetric survey was limited to the eastern third of the Seward Basin and was applied specifically to features of glaciological significance. Twelve bases were established in such a manner that they may be reoccupied in succeeding seasons and, when results have been plotted, provide a comparison of glacier behaviour.

Future Considerations

In its first field season "Snow Cornice" was essentially an experiment. Due to the untiring efforts, constructive suggestions and practical experience of its "charter members", it was a successful experiment. Thus the foundations, both physical and scientific, have been laid upon which to build in future years. Already a well-rounded scientific program has been proposed for 1949 which, far from excluding investigations unrepresented in 1948, seeks only the fullest cooperative interpretation of the environmental elements, which comprise this truly magnificent region.

[1]Personnel comprising "Snow Cornice" were:

P. D. Baird	Arctic Institute of North America; glaciology.
A. Bruce-Robertson	Geophysics and Medical Officer.
Dean Goodwin	Juneau, Alaska; air advisor.
G. R. Hall, 3rd	Meteorology and Botany.
Maurice King	Pilot; in charge of air operations.
B. Leighton	California Institute of Technology; glaciology.
R. S. McCarter	Harvard Mountaineering Club; logistics.
F. P. Magoun	Harvard Mountaineering Club.
M. M. Miller	American Geographical Society; geology and glaciology.
T. D. Northwood	National Research Council of Canada; geophysics.
J. G. Potter	National Research Council of Canada; geophysics.
G. P. Rigsby	California Institute of Technology; geology and glaciology.
J. H. Ross	Harvard Mountaineering Club; meteorology and botany.
D. J. Salt	Geophysics.
R. P. Sharp	California Institute of Technology; Senior Scientist in charge of geological and glaciological studies.
F. W. Simpson	National Research Council of Canada; geophysics.
B. O. Steenson	California Institute of Technology; geophysics.
Sir Hubert Wilkins	Arctic Institute of N.A. Equipage and organization.
F. H. Wood	Equipage and photography.
P. H. Wood	Meteorology and botany.
W. A. Wood	Arctic Institute of N.A., Director, Project "Snow Cornice".

Bristle-thighed curlew photographed on nest some miles north of Mountain Village, Alaska. The down-curved beak is about five inches long.

THE SECRET OF THE BRISTLE-THIGHED CURLEW

By Henry C. Kyllingstad

Introduction

THIS story began in Tahiti a hundred sixty-three years ago with the discovery of a sickle-billed bird which was christened *Numenius tahitiensis*. Because it has hair-like modified feathers on its flanks and thighs, Numenius became known as the "bristle-thighed curlew", a name no neater than the Latin version. The present chapter of the story occurs on a wind-swept plateau in western Alaska.

Ornithologists combed the South Sea Islands for the curlew's nest, but none succeeded. Then in 1869 a single specimen was collected at Kenai, near Anchorage. This discovery gave rise to the hope that its nest might eventually be found in Alaska. Later other specimens were taken at points extending from Hooper Bay to the headwaters of the Colville River.

These records, discussion with Mr. Charles E. Gillham, formerly of the Fish and Wildlife Service, talks with Eskimos in the lower Yukon River region, and observation of the birds in their spring flights over

Mountain Village led me to hope that I might be the fortunate one who would find the sought-after nest. H. B. Conover's description of the birds' calls ("The Game Birds of the Hooper Bay Region, Alaska", *The Auk*, vol. 43, 1926) enabled me to secure the migration records which, I think, were a strong link in the chain leading to the nest.

The curlew is about the size of a crow, but it is a slimmer model. Its wings, beak, neck, and legs are long and slender, and its beak is down-curved for about half of its five-inch length. The back is marked with tawny browns and buff; the underparts lighter with a few dark streaks on the flanks and more extending up the neck to the throat. The lower back and top of the tail are a light foxy-red. This tail coloring and the call are the best field marks. The well-known "wolf-call" heard on the city streets is a close enough imitation of the call to bring the birds wheeling about your head. The Eskimos call it "Chiu-eet".

Investigations in Alaska, 1944-1947

In following the various leads suggested by my Eskimo friends and the literature, I visited Kusilvak Mountain in 1944 and again the following year. Here I found no curlew, but near the peak I secured a pair of surf birds which I believe were about to nest. In 1946, accompanied by John Stophlet of Toledo, Ohio, I visited the region of small volcanic hills east of Chevak, Alaska. It was here that Eskimo informants told Charlie Gillham the bird could be found. We were not successful, but because we were able to cover only a limited part of the area, we revisited it in 1947, this time accompanied also by Mr. Warren M. Petersen, U.S. Government teacher of Kalskag, Alaska, and my eight-year old son, David. We covered the area as well as possible on foot and with a small boat, but again had no success. After nearly three weeks in this area, we went to the eastern end of the Askinuk Mountains which extend inland from Scammon Bay to a distance of about thirty miles. Here again we found no curlew. We did gain field experience and eliminated for practical purposes large areas from subsequent search.

1948 Expedition

On the strength of these four years of searching, together with a suggestion from Doctor George M. Sutton of the University of Michigan Museum of Zoology, I applied for a grant-in-aid from the Arctic Institute of North America in order to make a fifth attempt. By this spring the curlew's nest had become an obsession with me, so my wife says. I was extremely happy therefore, to receive a grant of $750.00. Warren Petersen agreed to come along, and later Dr. Arthur A. Allen of Cornell University asked if he might join our party. He brought assurance of funds from the National Geographic Society which we felt would be desirable if the Mountain Village area should be unproductive, in which case we

hoped to continue northward into Seward Peninsula. We were happy, too, for the opportunity to work in the field with so famous an ornithologist.

Following agreements with the Arctic Institute, Dr. Allen, and the Alaskan "bush pilot" who was to carry us and our gear, we all settled back restlessly to await the spring breakup which would enable us to move into curlew country. During this time I readied my equipment, built a de-luxe bird blind complete with zippers, and marked an Alaska map with pins to show every place where the curlew had been found or collected. The pins indicated Mountain Village to be near the centre of the area.

Search of the Igiak Bay Region

On June second Dr. Allen, his son David, and Warren Petersen arrived from Bethel aboard Nat Browne's Alaska Airlines Bellanca. After a few days of conferences and preparation of supplies, we took off on June fourth for the Igiak Bay region as Dr. Allen wished to secure photographs of the abundant wildfowl and shorebirds and we felt another search of the region would not be amiss. We made our camp at an unnamed lake at the base of a detached hill south of the main range. The inner end of Igiak Bay was visible from the top of our hill. The lower lands about us were largely tide flats.

This was indeed a bird paradise and a photographer's paradise too. Except for the occasional rain there was only one thing wrong—there were too many birds to photograph in the short time we planned to stay. In one week we photographed roughly thirty species at their nests.* In addition we had found nests of several other species and had blinds erected in readiness for more pictures.

We had decided to move two of our party to the hills north of Mountain Village on June eleventh. Dr. Allen and Warren wished to proceed with picture making at Igiak Bay, and so David Allen and I were to look over the Mountain Village spot to learn whether it would be worth the time of the entire party. This was the area that Warren and I had been interested in from the beginning as it was to these hills that all the migrant curlew had been headed.

Typical view of terrain north of Mountain Village, here a nest of the bristle-thighed curlew was first discovered in June 1948.

We made our camp on the shore of a large lake beside a mountain twenty miles from the village. This mountain is one of many that form a series of ridges extending northward into Seward Peninsula. Many small plateaus extend eastward from the higher hills.

Discovery of the Nest

On June twelfth there was a twenty mile wind from the east carrying with it a heavy drizzle mixed with patches of fog. Shortly before noon we decided to climb the mountain in spite of the weather. We tossed a coin which directed that David proceed south from the mountain top while I went north. I had gone about a half mile when I heard a loud, clear "piu-weet". This was it, and David knew it too as I had whistled imitations of the calls for him. I turned at the second whistle and saw a curlew leaving the middle of the plateau to head straight for David. The bird circled and called several times near him and then returned to the plateau. David headed for the ring of alders which separated the higher part of the hill from the plateau, and I cut across the brush-covered valley which lay between me and the curlew.

When I arrived at the edge of the plateau a half hour later, David was crouching behind some alders watching the centre of the plateau. A curlew paced across the open centre of the area. It seemed to confine its activity to the same general part of the plateau all of the time. We watched a while, whispered agreement on the likely location of the nest which we thought surely must be there, and then at a signal from David we rushed the spot. David had wisely removed his raincoat and high wading boots, and being considerably more of a runner than I, was soon ahead of me. The incubating bird flushed about thirty feet ahead of him and he reached the nest a few seconds before me.

Bristle-thighed curlew showing underpart of body. The nest is a slight depression with a few small pieces of lichen added.

Curlew on nest north of Mountain Village, Alaska, with newly-hatched, downy young.

There it was! The long-kept secret of the bristle-thighed curlew. The nest was a simple depression at the edge of a large black lichen. It measured 6¾ inches across by 2½ inches deep and contained four olive colored eggs marked chiefly about the large end with browns. A few small bits of yellow-green lichen appeared to be the only thing which the birds had added to the depression—no grasses or feathers lined it. Surrounding vegetation included moss azalea, crowberry, several forms of reindeer moss, a small sedge, and Labrador tea.

Observation of Nest

While we inspected the nest the parent birds circled about calling. Soon a long-tailed jaeger flew in from the north, and both birds took after it furiously. They were more than a match for this swift flier. The chase was a wild one indeed, and the curlews did not return until they had driven the jaeger more than a mile. We quickly set up my fancy zippered blind about twenty-five feet from the nest. While we were doing this a third curlew appeared and helped the others with their scolding. Because of the drizzle and poor light, and also because we wanted the birds to cover their nest before other jaegers appeared, we took no pictures but quickly left the plateau.

On the following day and every day until the young all hatched on the seventeenth, we returned to make pictures and notes. I secured the very first pictures in color and black and white on the thirteenth. The old birds quickly became so accustomed to our presence that we could photograph them at less than three feet without the use of the blind. We moved the blind closer—about six feet from the nest—and used it only when making moving pictures as the birds would return to the nest more quickly if we were out of sight. Once on the nest however, they would allow a very close approach, in fact in order to make pictures of the return to the nest we had to almost lift the bird off.

On June fourteenth, Warren and Dr. Allen arrived from Igiak Bay. David and I tried to hide our excitement and simply told them that we thought the area looked good; worth a few more days anyway. Evidently we were not very good liars as the Doctor soon asked "What do you two have up your sleeves?" They could hardly believe us when we told them we had found the nest and so easily. We could hardly believe it ourselves.

Discovery of Second Nest

On the fifteenth all of the eggs had small cracks at the large end. On the same day Warren found a second nest on the next plateau to the southward. This nest contained only two eggs. We were unable to find any young about, though there may have been some, or the other eggs might have fallen to jaegers. In order to preserve one egg from the first

nest in as good condition as possible Dr. Allen took the embryo out through a door cut in the side. Another egg he brought in to camp where he kept it in a pail with hot rocks in the bottom and a burlap cushion over them. At night he placed this egg in a tomato can with some cotton and took it into his sleeping bag. Two days later his foster-child hatched safe and sound and looked just like its brothers in the nest. This artificial incubation was necessary as the eggs could have hatched during our absence from the nest, in which case the old birds would have removed the shells, and our record of the nest would be incomplete. Fortunately all the remaining eggs hatched while we were present and we even secured motion pictures of the hatching and preserved all of the shells.

The parents were even tamer after the young hatched. The male bird allowed us to kill mosquitoes that were biting him about the face, to stroke his head and neck, and to lift his wings spreading the feathers beneath to record their color on movie film.

Photographic Work

Specimens including the parent birds from the first nest, the eggshells, a single downy young, and the nest itself are being sent to the U.S. National Museum. The other specimens will go to Cornell and other museums.

In the course of our work we saw as many as six curlew at one time. Every plateau extending eastward from the main range of hills appeared to have its pair of birds. David Allen who took few photographs and was able to scout around, saw as many as twenty individuals in a day. We believe that this entire range of hills may be so populated with curlew and probably constitutes the main breeding ground.

Few birds have ever been so thoroughly photographed. Four of us took still pictures in black and white and color and three of us made movies in color. Never have I had a more obliging subject for my cameras. If I live to be a hundred, I am sure I will never again have such an experience.

Our work at the curlew nest completed, we left on the twentieth for a somewhat anti-climactic additional week at Igiak Bay. We got a number of birds photographed that we had left undone on our first visit. Dr. Allen secured shots of the swans and godwits, both difficult and highly desirable subjects. On June 27 we returned to Mountain Village well content with the whole venture.

*Specimens included: Ruddy turnstone, Black turnstone, Spectacled eider, Emperor goose, Black-bellied plover, Cackling goose, White-fronted goose, Red-backed sandpiper, Pectoral sandpiper, Red phalarope, Northern phalarope, Alaska Yellow wagtail, Short-billed gull, Glaucous gull, Sabine's gull, Little brown crane, Asiatic gyrfalcon, Red-throated loon, Arctic tern.

NEW VESSELS FOR ICE NAVIGATION IN CANADA

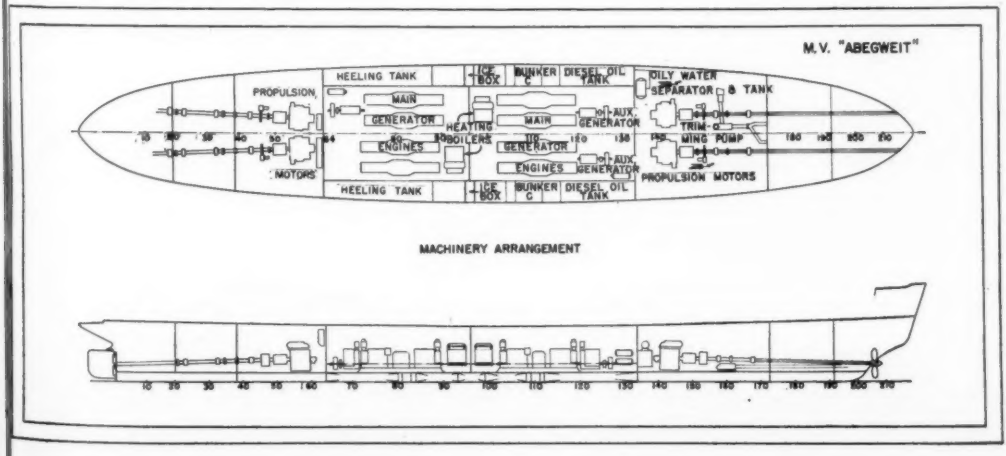
A number of additions have been made, or are about to be made, to the vessels employed in ice-filled seas around Canada. The following notes have been compiled to supplement the photographs published on pages 120-121.

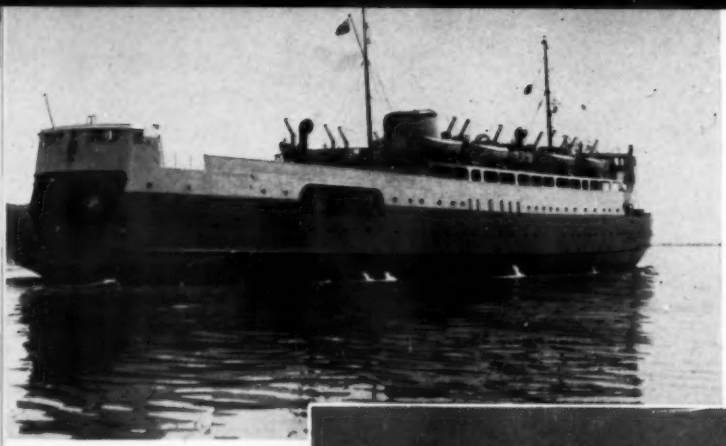
Abegweit

The first dependable service by train ferry across Northumberland Strait which separates Prince Edward Island from the Canadian mainland was provided in 1915 by a triple-screw vessel of 2,795 gross tons, the *Prince Edward Island*. A larger and more powerful vessel of 5,889 gross tons, the *Charlottetown* was added in 1931 and served successfully until her loss in 1941. In August 1947 SS *Abegweit* the world's largest ice-breaking train ferry, having a gross tonnage of about 7,000 and powered with 12,000 b.h.p. engines began operating. *Abegweit* is quadruple-screwed and powered by 8 sets of Sulzer diesel-electric engines. Two of the propellers are fore and two aft, to increase manoeuvrability. Length of the vessel overall is 372′ 6″ with an extreme draft of 19′ 0″. She can carry nineteen railway cars, sixty automobiles and 950 passengers. Ice conditions vary greatly from place to place in Canada. The particular problems needing to be met by the designers of *Abegweit* were 1. To be able to manoeuvre into wharves at either end of the crossing. 2. To operate in the broken ice which is swept through Northumberland Strait and which sometimes reaches a thickness of thirty feet. 3. To provide maximum propeller thrust with the vessel stationary. 4. To enable power to be transferred rapidly from the bow to the stern propellers and vice versa. Experience with twin-screw Canadian icebreakers in the St. Lawrence River had shown that they were often more efficient when going astern than when going ahead. This, together with earlier experience on the Prince Edward Island route with bow propellers, led the designers to fit two of these in place of the former single propeller. In the first season under comparatively difficult conditions, *Abegweit* was never stopped by ice. Her speed normally 6-10 knots was on occasion reduced to 1-3 knots. When this happened a sudden increase of power on the two forward propellers produced a powerful rush of water along the ship's side and quickly washed away the ice hindrance and increased the speed.

Abegweit is owned by the Canadian Government and operated by Canadian National Railways. It was designed by German and Milne of Montreal and built by Marine Industries Limited, Sorel, Quebec, Canada.

For a technical description of the vessel and comparison with ten other modern ice-breakers see:—H. H. German "M.V. Abegweit, Prince Edward Island Car Ferry", *The Engineering Journal*, January, 1948, pp. 3-11.





Prince Edward Island car ferry *Abegweit*, showing entrance for rolling-stock at stern.

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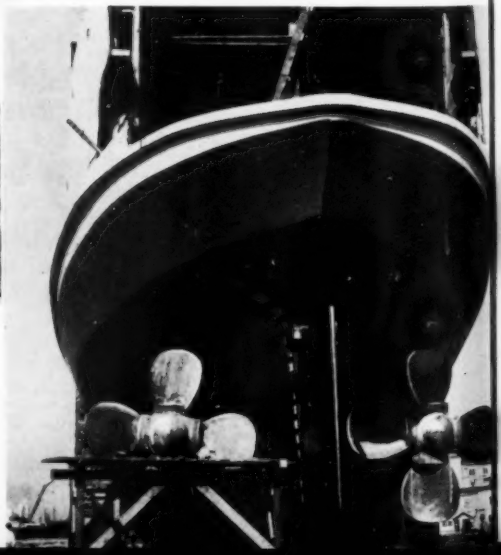
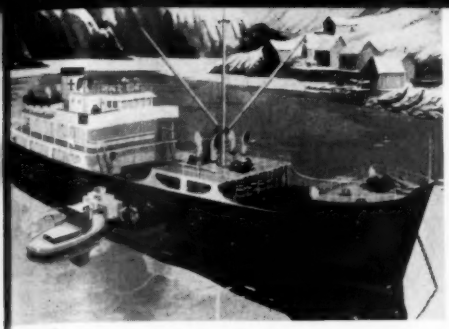
Abegweit ice-breaking car ferry used in Northumberland Strait, showing the powerfully built bows.

This ice-breaking ferry is equipped with four screws. Here are shown the two bow propellers.



Abegweit is a 7,000 ton ice-breaker ferry with 12,000 H.P. engines. Here shown are the two stern propellers which give a speed of from 6-10 knots in ordinary ice.



The new Hudson's Bay Company supply vessel *Rupertsland* was launched in Scotland in November 1948. It should be ready for service in Canada during the 1949 summer.

Hudson's Bay Company Vessels

The Hudson's Bay Company's new Eastern Arctic vessel—the *Rupertsland*—which will be in service in 1949, will be called upon to do only a part of the work of the *Nascopie*. Much smaller in size her carrying capacity is 500 tons, exactly half of that of her famous predecessor. The new ship is of the most modern all-steel construction, entirely welded, and will be powered by two diesel engines developing 300 h.p. each and propelled by twin screws. An unusual feature is the propeller-housing known as Kort nozzles. These are steel tubes of a special design to increase the thrust of the vessel when steaming forward at slow speed in heavy seas or large ice fields. At the same time the tubes protect the propellers against ice. Comfortable accommodation will be provided for twelve Fur Trade personnel, and ample refrigeration for carrying fresh foods into the far north. Like the *Nascopie*, she will be fitted with all the latest navigational aids, such as radar, echo sounder, gyro compass, etc., and her colouring will also be similar—black hull, white deck houses, and buff funnel. With a crew of sixteen, M.V. *Rupertsland* will be ready for her transatlantic voyage from Glasgow, Scotland, early in 1949.

Another vessel is at present under construction at Shelburne, Nova Scotia, for use in the western Arctic. Posts in that area are at present served by MV *Fort Ross* and the small schooner *Nigalik*. The new vessel is to be 140′ long with a 28′ beam and will be able to carry 400 tons of cargo. Power will be supplied by a 450 h.p. diesel engine. The hull is to be exceptionally strong not only because of ice conditions during the navigation season, but because there are no facilities in the area for removing the vessel from the water, so that she will need to remain in the ice all winter. When the vessel leaves the builder's yard in 1949 she will commence the long voyage to the western Arctic by way of the Panama Canal.

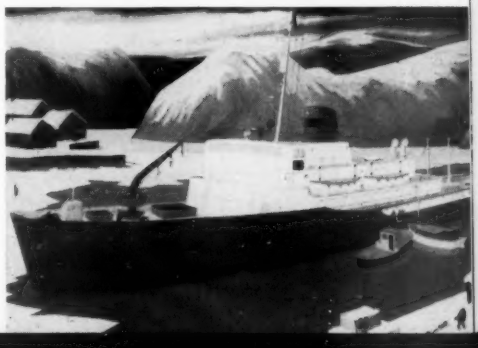
Eastern Arctic Patrol Vessel.

The annual patrol of the Canadian Eastern Arctic carried out regularly for more than a quarter of a century by the Administration of the Northwest Territories, will soon use a new vessel now under construction at Sorel, Quebec. The new ship was designed by German and Milne of Montreal. She will not be an ice-breaker in the usual sense of the term, but an ocean-going steam vessel, strengthened for use in ice. She is designed to carry 1000 tons of cargo and 88 passengers and to have a cruising range of 10,000 miles. When not in use by the Eastern Arctic Patrol, the vessel will service aids to navigation in the lower St. Lawrence and Atlantic coast region. Important dimensions are:—

Length between perpendiculars: 276′ 0″.
Draft: 18′ 0″.
Speed: 13½ knots.
Deadweight tonnage: 2615.
Engines: Two Uniflow steam engines, oil-fired, each of 2000 I.H.P.

The hull is to be of metallic arc-welded construction throughout with special attention to scantlings and framings to withstand crushing by ice. In addition to the usual passenger and crew quarters there will be a hospital, mail room, laundries and refrigerated space. Special ventilation has been planned to eliminate condensation, and particular attention has been given to heating.

The Canadian government is building this re-inforced ocean-going steam vessel for use with the Eastern Arctic Patrol.



NOTES ON FRANKLIN RELICS*

Mr. L. A. Learmonth, formerly of the Fur Trade Department, Hudson's Bay Company and a Fellow of the Arctic Institute has provided *Arctic* with notes and sketch maps concerning traces of the Franklin Expedition found in the King William Island region of northern Canada. The map published here is based on the Canadian National Topographic Series map on a scale of 8 miles to the inch, with amendments by Mr. Learmonth. The following items refer to the large map.

Mr. Learmonth and Mr. D. G. Sturrock discovered the remains of three men at Tikeraniyou (1) together with a George IV Half Crown and a large ivory sailor's button (Pootogo). The remains were taken to Gjoa Haven and the relics forwarded to Hudson's Bay House, Winnipeg[1]. The place is a point of land shaped like a crooked finger, and is where the land bends round to the southwest, between 12 and 15 miles west of Starvation Cove.

A skull and some bones were found at (2) near Washington Bay late in June 1942 and were taken to Gjoa Haven.

Two skulls were discovered on the beach at (3) near Tulloch Point in June 1942 and forwarded to the R.C.M.P. at Cambridge Bay, where they were buried near the grave of Patsy Klengenberg.

Remains of seven of Franklin's men were found at (4), Douglas Bay, by Paddy Gibson*.

Bones of four of Franklin's men were moved from islands at (5) and along with three others from Tikeraniyou were buried under the beacon at Gjoa Haven.

The following items refer to the small inset map of the Richardson Point area. Jaw bones of three white men discovered at (1) in June 1942. Most of the teeth were in place, in good condition, and not ground down as would have been the case with adult Eskimos. Mr. Learmonth also found one whole skull and many large bones scattered on the sur-

face close to an old Eskimo seal cache. Moss had grown over many of the bones. He erected a small cairn where the bones were discovered, and a larger one at the sky line on the ridge above, and which can readily be seen from the sea. He took all the bones to Gjoa Haven.

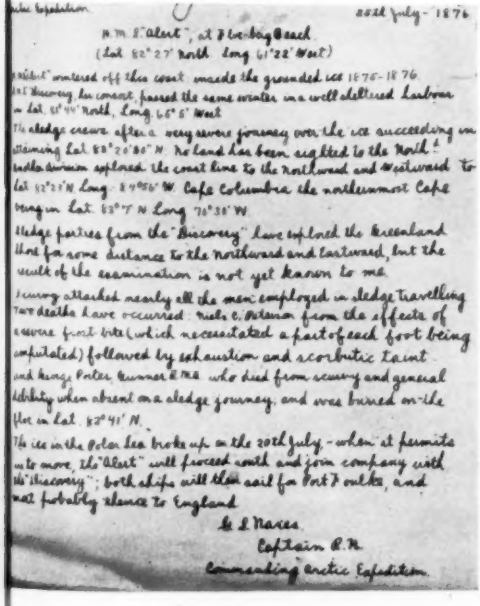
Neniook, Eyaritituk's mother, about seventy years old, reported having come across the skeletons of seven white men still partly clothed in blue serge, and partly buried in the sand and seaweed on a small island in the vicinity of (2). Hard boots with nails in the soles were also noted by Neniook who was a small child at the time. She was not available at the time Mr. Learmonth searched several small islands in the vicinity very carefully, but he failed to discover any evidence.

In a letter accompanying the above notes Mr. Learmonth suggests that it might be appropriate for a cairn or other memorial to be erected at Victory Point, King William Island "commemorating the landing of 105 men under Crozier from the abandoned *Erebus* and *Terror*". It was there, he points out, that the only written record ever recovered from the expedition was found. He also suggests a cairn and a memorial plaque for the grave of the seven men buried near the Hudson's Bay Company post at Gjoa Haven. "Their names of course are unknown, but did they not die in a great cause? Whoever they may be, did they not fight as tough a battle as any unknown soldier?".

In August 1948, Mr. Learmonth flew north from Winnipeg on the H.B.C. Canso with Mr. R. H. Chesshire, Manager of the Fur Trade Department. He plans to remain in the area of Fort Ross throughout the winter, in order to carry out archaeological, geographical and other studies.

*See also Gibson, Wm. Sir John Franklin's last voyage. *The Beaver*, June, 1937: 44-75.

NARES AND PEARY NOTES



22nd July - 1876

H.M.S. "Alert", at 7 Iceberg Beach
(Lat. 82° 27' North Long 61° 22' West)

"Alert" entered off this coast amidst the grounded ice 1875-1876
"Discovery" in company passed the same winter in a well sheltered Harbour in Lat. 81° 44' North, Long. 64° 5' West

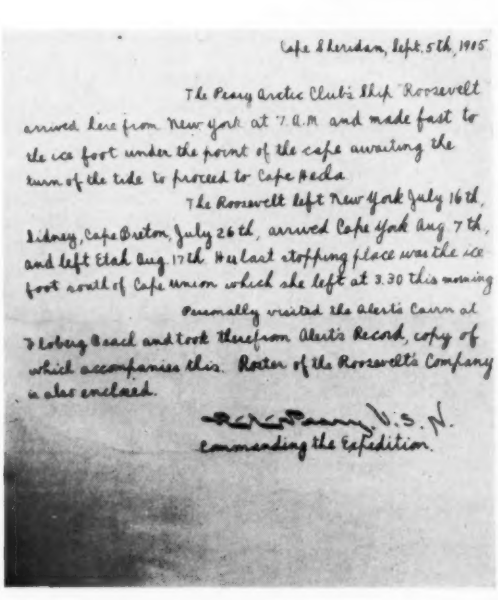
The sledge crews after a very severe journey over the ice succeeding in attaining Lat. 83° 20' 26" N. No land has been sighted to the North. Both ships explored the coast line to the Northward and Westward to Lat. 82° 28' N Long. 79° 56' W. Cape Columbia the northernmost Cape seen in Lat. 83° 7' N Long. 70° 38' W.

Sledge parties from the "Discovery" have explored the Greenland Coast for some distance to the Northward and Eastward, but the result of the examination is not yet known to me.

Scurvy attacked nearly all the men employed in sledge travelling Two deaths have occurred viz: C. Paterson from the effects of severe frost bite (which necessitated a part of each foot being amputated) followed by exhaustion and scorbutic taint and Henry Porter Gunner R.M.A. who died from scurvy and general debility when absent on a sledge journey, and was buried on the floe in Lat. 82° 41' N.

The ice in the Polar Sea broke up on the 20th July - when it permits us to move, the "Alert" will proceed south and join company with the "Discovery"; both ships will then sail for Port Foulke, and most probably thence to England

G. S. Nares
Captain R.N.
Commanding Arctic Expedition.



Cape Sheridan, Sept. 5th, 1905

The Peary Arctic Club's Ship Roosevelt arrived here from New York at 7 A.M. and made fast to the ice foot under the point of the cape awaiting the turn of the tide to proceed to Cape Hecla.

The Roosevelt left New York July 16th, Sidney, Cape Breton, July 26th, arrived Cape York Aug 7th, and left Etah Aug 17th. Her last stopping place was the ice foot south of Cape Union which she left at 3.30 this morning

Personally visited the Alert's Cairn at 7 Iceberg Beach and took therefrom Alert's Record, copy of which accompanies this. Roster of the Roosevelt's Company is also enclosed.

R. E. Peary U.S.N.
Commanding the Expedition.

U.S. Navy and Coast Guard icebreakers which re-supplied Canadian-U.S. Arctic weather stations in 1948 also visited the Cape Sheridan region on the northern coast of Ellesmere Island, Canada.

Two notes of historic significance were found in cairns, the one a copy of a message left by Captain G. S. Nares, R.N., in July 1876 and the other by Admiral Peary, U.S.N., in September 1905.

(R.C.N. photos)

ISACHSEN LAND

78° 47′ N, Lat. 103° 50′ W. Long.

In more than five years in the Arctic, travelling over the Polar Pack, discovering new islands, Stefansson and his companions brought back a great deal of new knowledge of the entire areas over which they travelled and forever blew away that fog of misconception that the Arctic was a grim place where man survived in spite of it. He found it to be a friendly place, and that it was possible to live comfortably off the country, to travel leisurely, and to acquire that spiritual aloneness and peace found only in the polar regions.

In order to achieve this, he travelled and clothed himself as the Eskimo has for some centuries. He lived in the traditional Eskimo snowhouse, where one may rest comfortably at sixty degrees above zero. He noted the northward spring flight of the geese and other birds, watched the great fog banks roll over Prince Patrick Island and Cape Isachsen from the Beaufort and Prince Gustav Adolph seas. He saw the faint track of the lemming and tail mark of the arctic fox in the snow; watched the arctic wolf tear down the caribou calves, and ate with gusto the juicy haunch of the muskox. He felt the soft ground smothered with moss and multi-coloured flowers under his feet in the short summer, the touch of frost on the cheek and heard the whistle of the rising wind and the drone of the blizzard. He relished it and he recorded it as a happy existence and one in which much was accomplished. This was more than thirty years ago.

It had been my pleasure to talk with Stefansson prior to heading northward in February nineteen forty-eight. My flight north touched briefly at Goose Bay, Labrador, and thence continued northward over Greenland to Thule, where I spent a happy evening with Dalkild a Danish meteorological scientist, and talked with Ootah who had been with Peary, and others who had travelled with Rasmussen.

The next day we flew into Resolute Bay on Cornwallis Island. Here we remained for three weeks getting our supplies ready for an airlift to Isachsen Land where we were to establish a joint Canadian-United States weather station. We flew several reconnaissance flights over Isachsen Land before finding a spot that looked likely for landing an aircraft. Finally early in April a safe landing was effected and eventually a mound of some 160 tons of equipment was made on the sea ice.

Here we were then, in this new land with a great mass of supplies; food of all kinds, an airborne tractor, sleds, clothing, three dogs—one ancient male, a pregnant bitch and a six weeks old pup; James huts, a prefabricated timber house, linoleum, chemical toilets, radios of assorted kinds, electric generator, medical stores, silex coffee makers, trail equipment of one kind or another, kerosene, motor fuel, aviation gas, diesel fuel, lubricating oils, unleaded gas and coal, a complete set of weather-recording instruments, hydrogen-making apparatus, lumber, beaver board, winch, antenna masts, stoves, paint, nails, tools, ice cutting saws, dynamite, Very pistols, an ice-cream mixer and a library of twelve books. This was to take care of us, to make life easier and more comfortable, so that we could do our weather observing. Everything had to be moved into place and buildings put up and the whole put into working order. A long hard job for seven men. There was little excitement over being in a new country never before explored and about which little is known. Why? Man and his machines? Man and his gadget thinking? Man in his desire to explore, at the mercy of his machines? With all the great mound of supplies and the seven men, one thing had been forgotten. This land had not changed; it remained the same as when Sverdrup and Stefansson charted its coast. The great and beautiful clouds still swept over it, the blizzards still hit the mountains and roared into the valleys, the pinched vegetation was still soft and glorious in the summertime. The landfast ice still clung to the shores as though to defy the ice breakers. The great stillness was still

here. It would never change. Only man had changed. He had harnessed himself to the machine, and somehow the machine seemed a little tawdry, a little out of place, a little futile and dirty. Nothing was simple any more. There was comfort of a sort, but not the hominess of a snowhouse. There were typewriters, but gone was the effort of writing what one saw and felt with the bare hand. Nobody sang, nobody whistled, it was a grim job. Only the land, misty in the drifting snow or brilliant under the high sun, remained the same. This would never change. There would always be that spiritual aloneness to be found here, but it was too simple, too basic; it was no longer what man desired. He had arrived here forty years after discovery, a stranger and an intruder in a strange land he would never understand.

May 7, 1948. ALAN INNES-TAYLOR*

*Member of the staff of a Canadian-United States weather station.

BOOK REVIEWS

MARINER OF THE NORTH.

By GEORGE PALMER PUTNAM. Duell, Sloan, and Pearce. New York. 246 pp. $3.50.

"He was not only a master mariner, but an uncanny ice pilot, for he was blooded in the hard school of the Arctic. He knew the coves and bays of Labrador, and his native Newfoundland, the glaciers from which the icebergs calved, the tides and currents of the straits that lead north and the vast ice-fields of the polar basin. In this forbidding region Bob Bartlett spent the greater part of his life; he loved every headland and barren cliff".—from an editorial in the New York *Times*. And such was the life of Captain "Bob" Bartlett, one of the greatest ice navigators of all time.

Captain Robert Abram Bartlett, born in 1875 at Brigus, a small fishing and seafaring village on the rugged east coast of Newfoundland, was brought up in the old tradition of the sea, the background of wooden ships and iron men. He was the hard-bitten master of the old school who commanded awe and respect in his crew as he paced the quarterdeck; yet beneath this was a gentle heart of gold, keen, sensitive, and understanding, with a singular love for the three great cornerstones of his life, the North, the *Morrissey*, and his mother.

His motto was "Eternal vigilance is the price of success", and his daily fare was hard work. This was the secret of his uncanny ability to navigate "by instinct". Hours, days, years of observing and soaking in the lore of the northern seas provided his rich background of experience. His bringing the damaged *Roosevelt* from Cape Sheridan on the north shore of Ellesmere Island to New York is in itself an epic of seamanship. His career and life were profoundly influenced by the major polar exploration of the early twentieth century, and represented the era of transition from the old geographical to the modern scientific exploration.

"Bob" Bartlett is sometimes referred to as a relic of the old school, but by misunderstanding only. Although without any formal scientific training he could see and appreciate the value of science. He was intensely interested in scientific polar work. Little known and little heralded are his fine series of biological collections made on the later *Morrissey* voyages, which have been

Captain R. A. Bartlett's schooner *Effie M. Morrissey* in the arctic ice.

Captain "Bob" Bartlett, master of the schooner *Effie M. Morrissey*.

described by Dr. Waldo L. Schmitt, "To study the Bartlett collections is to review the natural history of the Arctic".

George Palmer Putnam, a close friend of Captain "Bob", and the one who was to a large extent responsible for initiating the wonderful series of *Morrissey* voyages to the Arctic, is author of "*Mariner of The North, the Life of Captain Bob Bartlett*". It is not a true biography; but rather a series of tales and anecdotes that create the atmosphere in which "Bob" Bartlett lived. The profound influence of the various interesting events that affected the life of this singularly strong character makes this method of presentation quite effective.

The book is well written, the tales well told, and it is pleasant reading. George Putnam has included material supplied from a wide range of sources, from Captain "Bob's" many friends and family. Those who know the "skipper" and about his life will enjoy the familiar stories retold.

But the book does not contain the factual requirements for a true biographical presentation of his life. And throughout the book there are continually minor careless errors in dates and facts that make it confusing for one who wishes to search out biographical data. I point out a few such errors: Putnam states on page 179 that in 1940 the *Morrissey* reached a farthest north at Cape Sheridan, the winter quarters of the *Roosevelt*, whereas actually she only reached Latitude 80° 22′ North at the southern entrance to Kennedy Channel where ice prevented further progress northward. On page 212, although not directly concerning Bartlett, it is stated that Wilkins and Eielson were forced down 550 miles from Point Barrow and walked ashore; they made a landing on the ice at about this distance from Barrow, but on the return flight ran out of gas and were forced down only about eighty miles off the coast from which point they walked ashore. On page 219 Putnam records that Captain "Bob's" mother died in 1936; in fact she died in the spring of 1943.

But the book is, I believe, written with the idea that it is the big things that count, with the idea of portraying Captain "Bob's" character and the effect of the times and events in which he lived. Yet since this is the only complete work on Bartlett, a very significant figure in twentieth century polar exploration, it is regretted that biographical accuracy was not maintained, and some of the obscure and confusing phases of his life, which from all present accounts are rather vague, were not searched out.

No book could portray fully the character of Captain "Bob" Bartlett, or do justice to his long and fascinating career. His many friends will long remember the sincere and gentle simplicity of this sailor who sailed the northern seas for some fifty years. His niche in polar history is well earned; he is a true "Mariner of the North".

DAVID C. NUTT.

CANADA'S NEW NORTHWEST.

North Pacific Planning Project, Ottawa 1947. Obtainable for $1.00 from The King's Printer, Ottawa.

One of the most promising consequences of wartime interest in northwest Canada and Alaska, was the setting up of the North Pacific Planning Project as a joint Canadian-United States undertaking. The origin of the project lay in the Joint Economic Committees of the two countries, the prime purpose being to prepare an inventory of the natural resources of

an area of about 1,360,000 square miles, rather more than half of which lay in Canada. The United States withdrew from the Project in 1944, but the Canadian study group increased its activities, and expanded the areas originally covered, so that ultimately about 1,000,000 square miles was considered.

Canada's New Northwest is the report of the Canadian part of the Project. It is largely the work of Mr. R. K. Odell of the Department of Mines and Resources and Mr. W. Maxwell an industrial engineer. The work is divided into chapters which deal in turn with physiography and geology, agriculture, forests, fisheries, water power resources, transportation, wildlife conservation, population and meteorology. There are ten maps, most of them prepared specially for this work. Although the original plan for a joint undertaking by the two countries was not carried out, the Canadian report was well worth publishing. It sets a pattern which might be followed by other reports on the remainder of northern Canada.

T.Ll.

BIRDS OF ARCTIC ALASKA

By Alfred M. Bailey. Popular Series No. 8, Colorado Museum of Natural History, U.S.A. 317 pp. Map. $3.00.

The basis of this book is the 1921-22 expedition of the Colorado Museum of Natural History to the coast of Alaska between Cape Prince of Wales on Bering Strait and Demarcation Point on the international boundary.

The primary purpose of the expedition was to secure exhibit material for a new wing of the museum. This work was successfully accomplished. The interest of the author and his assistant, Russell W. Hendee, in ornithology led not only to the acquisition of a large collection of birds (2,000 specimens), but to the establishment of a contract with several residents of the region from whom the Colorado Museum and others have continued to receive specimens up to the present time.

The chief portion (pp. 133-302) of this book is a faunal list of birds which brings together under the species headings previously published records as well as new material from the collections made by A. J. Allen and Charles D. Brower and his sons. As the author points out in the introduction, the area covered is not arctic Alaska, but the arctic slope of Alaska, and the basin of the Yukon River is not included. Over 200 specimens, including some unconfirmed by specimens, are listed. Plumage description and life history notes have in general been omitted, and taxonomic discussions kept to a minimum. There is a bibliography of about 150 titles to which reference is made by dates following the author's name in the text. For some reason these dates have been rather frequently omitted, and the reader is left to infer from which of the author's publications the information is derived.

There are three other main sections:

(1) *Vegetation of the Arctic Slope of Alaska* by Joseph Ewan. In this short space a bare outline of vegetation only has been possible, but additional sources of information are pointed out.

(2) *Historical Sketch* (pp. 33-42) of the previous ornithological work in the region starting with the voyage of HMS *Blossom* in 1825-28. This is a useful and interesting section. It is surprising to find that there apparently has been no ornithological work done upon the arctic slope of Alaska except by local collectors since the end of the Colorado Museum expedition in 1922.

(3) *Narrative*. pp. 44-132. This is largely a day to day account with frequent direct quotations from the author's diary. It forms a valuable record of life and conditions in the area. The diary extracts contain numerous references to birds, most of which are repeated in the faunal list under the species concerned, and might therefore have been omitted from the narrative with advantage, especially to the general reader. A considerable part of the narrative had been previously published in the "*The Birds of Cape Prince of Wales, Alaska*".*

The single large map on a scale of 120 miles to 1 inch is ineffectual. A good map on a larger scale showing all the

places referred to in the text would have greatly increased the value of the book. At least the limit of trees and perhaps some other indication of the type of country might have been given with the map.

The work entailed in assembling the information presented in this book must have been very considerable, but there is no doubt that its usefulness to future students of the ornithology of northwestern Alaska will fully justify it.

T. H. MANNING.

*Bailey, Alfred M. The Birds of Cape Prince of Wales, Alaska. Proc. Colorado Mus. Nat. Hist., Vol. 18, pp. 1-113. 1943.

"THE GREAT MACKENZIE", in Words and Photo.

Text by Raymond Arthur Davies, photographs by George Zuckerman. (Toronto: The Ryerson Press. 139 pages, 100 photographs, $3.50).

"*The Great Mackenzie*" will have popular appeal for those who would like a rapid evening's trip through the Mackenzie valley of the Northwest Territories. An excellent set of 100 full-page pictures, arranged in ten logical groups, gives an adequate pictorial representation of the resources, transportation and people of the long valley. The pictures have been selected primarily for their "human interest", rather than as a record of life in the area.

It is unfortunate that readers could not enjoy the pictures without submitting to the newspaper-headline style of Mr. Davies, who has written the captions. Mr. Davies' sole purpose is to browbeat "the government" into more rapid development of the North and greater care of her Indian wards. His staccato style pounds away at this theme throughout the book, and the description under every picture is twisted to serve this purpose.

Readers of *Arctic* will not have to be told about the twenty-six factual errors in the text, and will recognize most of the half-truths. It is unfortunate, however, that the general public will accept this irresponsible writing as accurate description. Some of his statements *are* true, and therein lies the difficulty, for readers who do not know the North will not be able to discriminate.

For example, Davies states on page 70 that "it is believed that 100,000 square miles of the Mackenzie Basin is suitable for farming". He does not say that probably Mr. Davies is the only man who so "believes", but on page 112 he slips by admitting that "hundreds of thousands of square miles are ruled by mosses and swamps". (Out of a total area of 125,000 square miles!) He condemns the lack of education by saying that there are no public schools in the Northwest Territories, thereby ignoring the public schools at Fort Smith and Yellowknife, the largest settlements. Twice he states that "the Eskimos have been wiped out by venereal disease and whisky", a fact that actually refers only to a small group of Eskimos who lived near Herschel Island in the whaling days half a century ago, whereas Canada is proud of the way the trading companies have kept whisky away from the Eskimo, and venereal disease is virtually unknown among these happy people. Davies uses words loosely and extravagantly, such as "coal *abounds* at Fort Norman" when referring to a small seam of low quality, and "land is *lush* at Fort Simpson," referring to the grey-brown woodland and muskeg soils.

Davies condemns our lack of development by comparing Leningrad, U.S.S.R., on the same latitude, with tiny Fort Smith, when they have nothing in common in the way of climate, resources or accessibility. He suggests several major plans for development, not knowing of, or ignoring, the fact that most of the points are already being actively pursued by the Government.

"*The Great Mackenzie*" is a good book to look at, and will be an entertaining book for those who know the North and remember "the great Barnum". For those who sincerely want to see orderly development of our Northland, this book has not really helped the cause.

J. LEWIS ROBINSON.

GLACIOLOGICAL RESEARCH ON THE NORTH ATLANTIC COASTS.

By Hans W:son Ahlmann. Royal Geographical Society Research Series No. 1, London, 1948. 83 pp. Maps, diagrams, graphs, tables, index.

Professor Ahlmann points out in his introduction to "*Glaciological Research on the North Atlantic Coasts*", that it was impossible to standardize the publications of the various research teams which have carried out glaciological research under his guidance. It was because of this that he "decided to complete a critical and uniform summary of what I considered to be the most important results of our twenty-two years' labour in the hope that it might benefit future research". The present report is a critical study of the behaviour of glaciers: it contains the essence of the previous research papers. It is a search for a "closer understanding of glaciers and the laws governing their behaviour".

Professor Ahlmann deals with six areas that encircle the North Atlantic from Norway to Greenland, the number of sites being limited only by time, finance and other practical considerations. Care was given to the selection of areas which included Jotunheim, the largest alpine area in Norway; the Kårsa Glacier is the only glacier in Sweden that has been examined periodically since the beginning of the century; the ice sheets of North East Land, the typical valley glacier in West Spitsbergen, the Vatnajökull (Iceland) a glacier cap covering a mountainous area, and Clavering Island which has an arctic-continental climate. The physical phenomena associated with each glacier are treated separately under the major chapter headings of Accumulation, Ablation, Firn and Glaciation Limits, Regime, Rate of Movement and Classification. Each chapter begins with a clear definition of the scientific term, to be followed by the methods employed in securing information and an analysis of the physical phenomena associated with each of the processes in the life of a glacier. Maps and graphs are excellently employed to illuminate the technical discussion. Chapter IX on "Variations of Glacier Margins and Volumes, and the Causes of such Variations" is likely to be of particular interest to the non-technical reader in search of information on the much-discussed topic of climate variation in the recent past. It is pointed out that "the glaciers in Iceland were far less extensive . . . [during] A.D. 870-1264 than they were at the beginning of the 1930's. The present recession of the glaciers has now proceeded so far that districts cultivated by the Free State (A.D. 870-1264) farmers are again exposed, after having underlain ice for six hundred years".

Professor Ahlmann ends the summary of his results by noting that "The investigations refer for the most part to regions round the northernmost part of the Atlantic . . . and it is not possible to decide on the extent to which these results can be applied outside the region investigated. The investigations are of such general value . . . that it may be considered desirable to extend them to other parts of the earth. . . . At the present rate of development in aviation it should not be difficult to establish and maintain stations on the ice areas".

W. A. Black.

NO PATHWAY HERE.

By John H. Marsh. Hodder and Stoughton, London and Howard B. Timmins. Cape Town. 1948.

In January 1948 news began to leak into the world's press of the occupation of some small islands somewhere between South Africa and the Antarctic by South African naval forces. In the absence of more exact information, the writers necessarily used their imaginations as to the whereabouts of the islands and the reasons for occupying them. *No Pathway Here* is an account of the undertaking, written by a journalist who travelled on one of the units of the expedition. It was published with remarkable speed, being off the press by May 1948, thus making available most of the details of the enterprise even while they were closely guarded secrets in some government files.

John H. Marsh has done a masterly job of describing the rush and bother that resulted when, shortly before Christmas 1947, H.M.S.S. *Transvaal* was ordered to sea on secret orders which, when later examined proved to require the occupation of Prince Edward Island and Marion Island. Before the vessel left, stores, buildings and personnel had been collected together hurriedly so that a permanent settlement could be established on the islands. Practically nothing was known about conditions on them, and as South Africa had not taken an active part in polar exploration, even the obtaining of suitable clothing and buildings was a major undertaking. It was found that the only chart available had been made by H.M.S. *Challenger* in 1873, under the command of Captain G. S. Nares. Students of polar history will note with interest that the work of Nares has come to the fore in 1948 both from the far south and the far north, reminding one of far-ranging exploration by the Royal Navy in the nineteenth century.

The main purpose of occupying the Prince Edward and Marion islands was to establish a weather station and to confirm the transfer of authority over them from the United Kingdom to South Africa. As the book describes so vividly, there were times when it looked as if any sort of a landing on the islands would be impossible, and even when the first party was put ashore, it seemed improbable that a permanent settlement could be achieved. There was a certain amount of musical comedy atmosphere about the undertaking since officials in South Africa were waiting anxiously for news of the occupation of the islands while the H.M.S.S. *Transvaal* was tossing in violent seas, with waves of more than 25 feet and a wind of Beaufort scale 8. Eight days after leaving Cape Town a landing was finally made on Marion Island. Later, one landing was made on Prince Edward Island.

The terrain of the islands is high and rugged and there is much swamp, although grass exists and may be suitable for sheep raising. The fauna include King penguins, seals and sea lions, but insects appeared to be absent. The islands have long had the reputation of being "bleak, boisterous and foggy" and the experience of the South African expedition justified this description. There is every assurance that the staff of the meteorological station will face an interesting and stimulating time since violent changes in the weather appear usual.

The establishment of a first class meteorological station on Marion Island, in combination with the Australian stations on Heard and Macquarie Islands will help to close an important gap in our knowledge of ocean weather in the southern hemisphere. The Prince Edward Islands despite their difficult climate are not truly antarctic since they are in latitude 47° S, equivalent to that of Newfoundland in the northern hemisphere.

No Pathway Here is illustrated with many photographs taken by members of the expedition, including one showing its rather chilly personnel celebrating the annexation of the islands by drinking their Christmas champagne.

T.Ll.

TO THE ARCTIC.

The story of northern exploration from earliest times to the present. Jeannette Mirsky. Introduction by Vilhjalmur Stefansson. New York. Alfred A. Knopf. Toronto, The Ryerson Press. 1948. $5.00.

To the Arctic! was first published in 1934 as *To the North!* but was withdrawn shortly after publication because of a threatened action for libel by the late Dr. Frederick A. Cook. The present volume is a revision of the 1934 book, with material added to bring it down to the present day.

After a brief introductory discussion of arctic scenery and some of the reasons which have prompted men to explore the north, the author commences her long task by discussing the Greeks and Vikings. There follow accounts of pre-Columbian and post-Columbian attempts to reach Cathay, summaries of Dutch explorations in the Arctic and an

account of the exploration of Hudson Bay and Baffin Bay. Two chapters are used to give an excellent summary of Russian expansion into Siberia, of Bering's voyages, the story of Semen Dezhnev and others, ending with Wrangel's sledge journey.

British exploration in the nineteenth century occupies three chapters, with much of the space given to Franklin's voyages and the Franklin Search. In a discussion of "The Route to the North", the stages by which the open polar sea was reached through Kane Basin and Robeson Channel are described with a fitting tribute to the magnificent work of the Nares Expedition of 1875-76. Other chapters deal with the exploration of Greenland from Hans Egède in 1721 to Gino Watkins and Courtauld. The last four chapters summarize the search for the Northeast and Northwest Passages; exploration of Jones Sound and Beaufort Sea; Peary's achievement of the Pole, and Flying in the Arctic. The penultimate chapter includes a statement headed "The truth about Cook" which outlines the views of the author as to where Dr. Cook really was when he claimed to be making his remarkable journey to the North Pole.

To the Arctic! is well illustrated with photographs and maps. Appendices include a list of the Franklin search parties and a chronology of northern exploration. T.Ll.

ROSTER OF ARCTIC SPECIALISTS

The Arctic Institute of North America is compiling a roster of persons with Arctic experience. It is to include scientists, traders, missionaries, administrators, explorers and others with field experience in any part of the Arctic. The Directors of the Project would be glad to receive the names of any persons who should be added to the roster. Information may be addressed to the Director, Arctic Institute Roster, 1530 P Street Northwest, Washington, D.C.

NORTHERN RESEARCH REPORTS

Archaeology

In November 1947 the National Museum of Canada set about organizing an international archaeological expedition to excavate some ancient Eskimo ruins near the two weather stations that had been erected that summer in the Canadian Arctic Archipelago, one at Resolute Bay on Cornwallis Island, the other in Slidre Fiord, Eureka Sound, on the west coast of Ellesmere Island. It invited Dr. Henry B. Collins, of the United States National Museum in Washington, to excavate the sites in Resolute Bay; and it asked the National Museum of Denmark to provide a Danish archaeologist for the excavation of the sites in Slidre Fiord, which lies on an overland route to North Greenland. Furthermore it planned that either its Director, Dr. F. J. Alcock, or the Chief of its Division of Anthropology, Dr. D. Jenness, would visit the two sites while they were being excavated, and that all specimens recovered would ultimately be divided between the three National museums.

Unfortunately the National Museum of Canada was not able to arrange for the transportation of an archaeologist to

Slidre Fiord, and had to give up that part of its program. About the middle of July, however, it did succeed in arranging for Dr. Collins and an assistant from Canada to be flown in to Resolute Bay; and when the airfield there proved to be temporarily inoperative, in having them landed at the Frobisher Bay airport, on Baffin Island, where they happily discovered other ruins that promised a profitable field-season.

Excavations were carried out during July and August at a prehistoric Eskimo site near the mouth of Sylvia Grinnell River at the upper end of Frobisher Bay. The excavations were of significance in revealing evidence of Dorset-Thule relationships in a region previously unknown archaeologically. The site consisted of four semi-subterranean houses built of stones, whale bones and turf. They were oval to rectangular in shape, with a narrow sunken entrance passage. The houses were almost completely covered with a dense growth of moss, willows, grass and other vegetation.

Only Thule material was found inside the houses, while the adjacent middens contained both Thule and Dorset objects, the latter for the most part at deeper levels. This would indicate that Thule culture people were the last occupants of the site but that they had been preceded by Dorset Eskimos who presumably had built the houses. There was no trace of metal. Stone implements, which were abundant, were preponderately Dorset in type, consisting of asymmetrical knife blades, end and side scrapers, harpoon and arrow blades of chipped chert. Very few rubbed slate blades were found. Animal bones from the houses and middens showed that the people had subsisted principally on seal and caribou. Whale, walrus, beluga, birds and fish, and probably also dogs, were of secondary importance as sources of food.

Measurements and physiological observations were also made on a series of living Eskimos—40 males and 40 females, all adults. These Frobisher Eskimos were found to consist of two principal types. The first—the more typical Eskimo—had a wide but relatively low face, low forehead, small narrow nose, epicanthic fold, and light skin. The other was more Indian-like, resembling the type which prevails in other parts of the Central Arctic, the distinguishing features being a wide and high face, high and wide forehead, a relatively large and convex nose, large mouth, and dark skin.

Dr. Henry B. Collins was assisted in the work by Mr. Colin L. Thacker of the Division of Biology, National Museum of Canada.

Lake Mistassini, Quebec

A second archaeological reconnaissance was made to the region of lakes Mistassini and Albanel, Quebec between June 14 and September 25 by Edward S. Rogers and Murray [illegible] Rogers. Financial aid was received from the Robert S. Peabody Foundation for Archaeology, Andover, Mass., and the Viking Fund of New York. The canoe route began at Oskelaneo River, Que. and reached Lake Mistassini by way of lakes Lynxeye, Nemenjish, Obatogamau, Chibougamau and Waconichi. From Mistassini the trip continued northward to Lake Albanel and thence for twenty-five miles up the Temiscamie River to Lake Tournemine. There a few excavations were made to determine the vertical distribution of artifacts on sites located during 1947. The east coast of Lake Albanel was next surveyed as far as the "Long Portage" which was then taken to reach Lake Mistassini. Leaving Lake Obatogamau the party crossed the divide separating the St. Lawrence drainage basin from that of Hudson Bay, to reach Lake Ducharme and continue up the Scatsi River to Lake Potrincourte and so back to Gouin Reservoir and the Hudson's Bay Company post at Oskelaneo River.

Over eight hundred artifacts were collected. The majority of the knives, spears, scrapers and axes were percussion chipped from quartz, while a few were made from flint. A number of prehistoric sites were located along the seven hundred miles of route traversed northward from Gouin Reservoir. Geographical notes were compiled throughout the journey.

Aerobiology*

Prof. Nicholas Polunin, MacDonald Professor of Botany, McGill University, Montreal, returned late in September 1948 from an extensive series of flights northward from Alaska. His main purpose was to gather spore specimens in a special device designed in collaboration with scientists of the United States government. Prof. Polunin returned with about 80 glass plates which had been exposed at various heights on flights which included one over the north geographical pole. He reported that the work done so far, in cooperation with Dr. S. M. Pady and Dr. C. D. Kelly also of McGill University, had indicated a previously unsuspected abundance of bacteria, mould, yeast, pollen and other living botanical particles in the air over the arctic regions. Stem and leaf rusts of wheat and foot-rot of rye and barley were found in 1947 over the arctic islands near the north magnetic pole.

The apparatus used to collect spore specimens is fitted into the nose of the aircraft so that any organisms in the air coming in contact with it become fixed to a plate treated with a special silicone smear which remains sticky even at temperatures as low as -90° F. On the most recent flight the temperature at 25,000 feet above the north pole was found to be -48° F. while not long before, near sea level it had been slightly below freezing point. The apparatus used during summer flights for gathering spores is being modified for use on a winter flight early in 1949, so that plates may be exposed without "depressurizing" the aircraft.

*See also "Aerobiological investigations in the Canadian arctic and subarctic" in *Arctic* Vol. 1, No. 1, pp. 60-61, Spring 1948 and "Arctic aerobiology, Preliminary report on Fungi and Bacteria isolated from the air in 1947" *Nature* Vol. 162, pp. 379-381, Sept. 4, 1948.

Botany

By Canoe Across the Ungava Peninsula Via the Kogaluk and Payne Rivers

Report supplied by Dr. Jacques Rousseau

Professor M. L. Fernald's ideas on the persistence of plants in unglaciated areas in northeastern America have for the last twenty years been a storm centre in American phytogeography. As far as Quebec was concerned, the discussion was limited mainly to the Gaspé peninsula and other arctic or subarctic habitats which are found in the Gulf of St. Lawrence region.

The need to study the hypothesis in the light of new facts became apparent. Hence surveys in the interior of Anticosti island, which, was supposed to have escaped glaciation, were made in 1940 and 1942. The great unknown, however, being the interior of the Ungava peninsula, and northern Quebec in general, I decided to give my attention to this problem. To fulfill the plan, three different areas were studied in succession 1) from 1944 to the spring of 1947, the subarctic forests in the limestone area of Lake Mistassini; 2) in the summer of 1947, a survey of George River[1],—which, flowing from the height of the land, north of Lake Michikamau on the Quebec-Labrador boundary, provides a good cross section of the vegetation from the subarctic forest to the arctic barren land; 3) finally, this year a sector of the Ungava peninsula north of the timber line, between Hudson Bay and Ungava Bay via the Kogaluk and Payne rivers[2].

Except for a traverse by Robert J. Flaherty[3], along the Payne and Povungnituk rivers in 1912, no other traverse of the Ungava peninsula north of the timber line had apparently been made. Furthermore, on this summer's trip, only the lowest part of the Payne River touched the route followed by Flaherty.

Planned first as a one man general survey (with emphasis on botany) the purpose of the 1948 trip was gradually widened. I first accepted the suggestion of Mr. Edgar Aubert de la Rüe to accompany me as geologist, and a grant from the Arctic Institute was subsequently obtained to make this possible; Mr. Pierre Gadbois was later added to the party as geographer from the Geographical Bureau of the Dominion Department of Mines and Resources and finally, Mr. Jean Michéa of the National Museum, Ottawa, joined the group as ethnologist and archaeologist. For my own part, outside of planning and leading the expedition, I concentrated principally on the biological (and mainly botanical) aspects of the survey. It is still premature to report on the technical

aspects of our work: each member of the party will later furnish a report on his own activities and observations. Consequently, this note is confined to general observations.

After flying from Montreal airport, by R.C.A.F. to Fort Chimo, a chartered Canso of the Mont-Laurier Aviation Company carried the party of four technicians and four Indian canoers to Povungnituk trading post on the Hudson Bay coast, on the 14th July, 1948. The aircraft carried all equipment including two eighteen foot canoes. Because of a very early break-up the Canso was able to land on Payne Lake where we made a cache, thus simplifying the problem of transportation.

With the assistance of two Eskimos and their nineteen-foot canoe, as well as a collapsible canoe of the kayak type seating two men, the party left the mouth of the Kogaluk River on July 17th and followed its course until the 27th. Then began a four-day portage of over twenty miles. The area crossed consisted of low hills cut by small brooks and lakes, lying between the drainage basins of the Kogaluk and Payne. The first part of the portage over, the Eskimos returned to their base with their canoe, as had been agreed upon, the three other canoes now being sufficient to carry the remainder of the load.

Reaching the cache on Payne Lake on August 2nd, the party followed the Payne River until the 12th, when the canoeing ended at the Payne Bay trading post on Ungava Bay. A whole week was spent there surveying the surrounding territory.

The two rivers, Kogaluk and Payne, present widely different aspects. As an Indian guide told me one day, "Rivers are like women, each one has her own character, and we sense it in the early days following the first meeting". The Kogaluk consists of a chain of lakes separated by low falls. The Payne, on the contrary, is a swift river (although not as rapid as the George River), without falls and with very few portages: as there is sufficient water, one can "shoot" nearly all the rapids when going with the current. An outboard engine may be used on both rivers, but, because so little was known of the territory it seemed preferable to reduce the weight of all equipment and to avoid having to portage motor and gasoline. Moreover, such travelling gives one more opportunity to collect biological and geological specimens, since the shores are more easily followed closely.

A striking feature on the whole trip was the almost complete absence of caribou. From the Hudson Bay coast to the centre, not a single fresh track was seen. Old caribou trails only were encountered and moreover, as viewed from the air, these were very rare. From Payne Lake to the Ungava Bay coast, caribou trails were more frequent, though fresh tracks were seldom seen. Only three caribous were spied by the party. Nevertheless, as one would easily surmise, grazing possibilities are very good. The dominant wild life in the interior as far as we could judge, considered from the economic point of view, consists mainly of gray trout, Canada goose and lemming. The extreme abundance of the latter this year is an indication of abundance of white foxes for next year.

It may be a surprise to some to learn that we employed as canoe men, Indians who had never travelled in such country and who were in an area far removed from their own, the subarctic forest north of Seven Islands on the St. Lawrence. This was done because Indians are unsurpassed in canoeing and portaging. They are inland people while the Quebec Eskimos are coastal, and travel in the interior only occasionally for hunting purposes and then by komatik in early winter. Eskimos are unaccustomed to portages and to travelling by canoe on rivers. In less than a day, the Indian canoers from the "bush" had adapted themselves to the tundra and the camp fires of green willows. Even if they were in a country entirely unknown to them they found their way across the barren land more easily than did the Eskimos. When travelling in the interior the Eskimo relies generally on his cairns to guide him; the Indian, on the contrary, relies on the sun. After leaving the Kogaluk River and travelling for four days while crossing the valleys

between this river and the Payne, with vision limited because of low hills, we went directly to our cache and lost no time searching for it.

[1]See page 93 for an account of this expedition.

[2]A number of services and organizations have co-operated in making this expedition and that to the George River a success. In the formal reports, due credit will be accorded to all of them. Nevertheless, in this preliminary note, I am happy to cite particularly the Royal Canadian Air Force, Geographical Bureau, National Museum, Defence Research Board, Arctic Institute, Government of the Province of Quebec, City of Montreal and the Hudson's Bay Company.

[3]Flaherty, Robert J. Two traverses across Ungava peninsula. *The Geographical Review* (New York), 6: 116-132. 1918.

Geology

Geological survey through the Ungava Peninsula.

Report supplied by E. Aubert de LaRüe

This survey, made during the months of July and August, 1948 thanks to financial aid granted by the Arctic Institute of North America, has permitted a broad study of the geological structure and physiography of the region extending from Hudson Bay to Ungava Bay, and located between 59° 30′ and 60° N. lat. The route followed, via Kogaluk River, Payne Lake and the river bearing the same name, measured 350 miles, and was made by canoe with Dr. Jacques Rousseau, Mr. Pierre Gadbois and Mr. Jean Michéa.

The physical formation of the region consists of a plateau, the maximum elevation of which hardly exceeds 600 feet; the altitude of Payne Lake being approximately 440 feet. Very uniform as a whole, the appearance of the plateau, however, presents some aspects which vary quite considerably in its details according to the importance and nature of glacial deposits. The Payne River basin appears more considerably dissected than that of the Kogaluk, and these two large rivers flow quite differently. The Kogaluk flows toward Hudson Bay by a series of steps, creating numerous falls—around twenty—the highest of which is 22 feet. In fact, this river is formed by a series of lakes of which the most important ones number 14. Payne River, on the contrary, flows out of Payne Lake, enters a sunken valley, crosses no lakes, and forms no falls. It presents, however, numerous rapids, and the current is swift.

The formations encountered belong for the most part to the Archaean, except in the East, bordering Ungava Bay and in the lower valley of Payne River, where a belt fifty miles wide corresponds to certain Algonkian strata, of a much more varied but definitely less metamorphic nature. From the mouth of the Kogaluk to the point where the estuary of the Payne begins, there stretches a complex of gneisses and granite. There are also garnet paragneisses, sometimes quite recognizable, and sillimanite paragneisses, often accompanied by banded amphibolite heavily granitized in places and altered to migmatites. The latter, considerably developed, are accompanied by unrestricted and very heterogeneous granitic masses characterized by a texture which is often porphyritic and by the abundance of amphibolite enclaves. Numerous pegmatite dykes and rarer ones of diabase together with some small bodies of gabbros cut this complex. The direction of these formations, which is N-S along Hudson Bay, swerves to NW-SE in the middle and upper valleys of the Kogaluk, as well as in the Payne Lake region, while it is NE-SW in the Payne valley.

The Algonkian complex in the lower valley of the Payne includes quartzite, mica-schists and gneisses in certain places, and various types of metamorphic schists, with a few small bodies of serpentine and gabbro. Tremolite and magnetite quartzitic sandstones cover large surfaces north of Kyak Bay, on Ungava Bay.

Among the economic minerals encountered, related especially to the Algonkian formations, the following should be mentioned: magnetite, chalcopyrite, talc, asbestos and garnet.

The striae observed show an East-West progression of glaciers along the entire valley of the Kogaluk River, while those in the Payne River valley, vary between N 50°E and N 70°E. A few eskers have been encountered more particularly between Tasiat and Payne lakes, and a zone noteworthy for its frequence of drumlins was crossed in the upper valley of the Kogaluk River, between the three Igluluk lakes.

Sea terraces with pleistocene fossils may be seen on the slopes of Hudson

Bay as high up as 100 feet in altitude, while on the slopes of Ungava Bay raised beaches, formed more especially of boulders, and which reveal no fossils, rise in tiers to a height of 250 feet.

Aside from the main route followed, geological observations were made in Povungnituk Bay and around Fort Chimo.

Geography

The recently established Geographical Bureau of the Canadian Department of Mines and Resources carried out field work over a wide area of northern Canada during the 1948 field season. Among the projects completed were the following:–

Study of the hydrography of Mackenzie Waterway and the Western Arctic as far east as Boothia Peninsula. Mr. J. K. C. Fraser of the University of Toronto recorded changes in the navigable waters of the Mackenzie route, assisted in the resurvey of the harbour at Tuktoyaktuk and visited trading settlements on the mainland coast and the south coast of Victoria Island, making reconnaissance maps of their harbours and recording the best sailing routes. He accompanied the Hudson's Bay Company vessel *Nigalik* to Spence Bay, making a sketch plan of the harbour and the site selected for the trading post which is to replace Fort Ross.

Physiography of Baker Lake and the Thelon River west to Beverly Lake. Mr. J. B. Bird of the University of Toronto, accompanied by Mrs. Bird and two students of geography studied the Baker Lake area, and travelled upstream by canoe as far as Beverly Lake, making a reconnaissance survey, and recording the physical geography.

Operation Magnetic. Mr. John Carroll of the Topographical Survey and Mr. J. L. Jenness of the Geographical Bureau accompanied the annual magnetic survey to northwestern Canada. They were able to complete thirteen observation points on the mainland, and on several islands as far north as northern Melville Island and as far east as Resolute Bay. The geographical results of the expedition include numerous map changes, accurate astronomical fixes, extensive notes on ice conditions, terrain and vegetation. The party was in the field for more than two months, transportation being by R.C.A.F. Canso flying boat. The party was unable to complete its northwesternmost points due to clouds and icing which developed at the end of August.

Task Force 80.

Two geographers–Dr. R. T. Gajda and Mr. T. R. Weir were among the scientists who accompanied Task Force 80 to the Canadian Arctic during July, August and September, 1948. As a result of their work, a considerable number of important changes will be made on Canadian maps, studies of terrain, ice conditions, natural vegetation and geology were also made. When the two geographers were at Resolute Bay having approached it from the east, they met members of the Magnetic party already mentioned, who had arrived from the west. This casual completion of the Northwest Passage, in part by air, is typical of the manner in which travel facilities in the north have improved enormously in recent years.

Ungava Peninsula.

Mr. Pierre Gadbois of the Geographical Bureau accompanied Dr. Jacques Rousseau on his canoe journey from Hudson Bay to Ungava Bay.

The widespread activities of members of the Geographical Bureau staff in its first season–they were scattered from northern Ellesmere Island to the Mackenzie valley–is an indication of the renewed efforts of Canada to explore its northern territories, following the reduction of such work during the war years.

Permafrost

Mr. R. A. Hemstock, Edmonton, Alberta, has continued his study of permafrost reported in *Arctic*, Vol. 1, No. 1. His purpose is to gather and compile all available data on permafrost in the Norman Wells area and to continue a study of permafrost and related soil and snow mechanics with a view to improving the present methods of road building, communications and general construction in the arctic and subarctic regions.

Average air temperature readings, air temperature readings under various buildings and readings of soil temperatures have been continued during the summer. When the results are finally complete these recorded temperatures should give much valuable information on the effect of temperature on frozen soil.

Additional measurements to determine the depth of permafrost were carried out. Some difficulty was encountered in getting thermometers to the required depth in old wells which had waxed up a good deal in the permafrost zone. However, results were obtained in two additional wells and although not completely checked, they indicate a varying depth of permafrost. This work will be continued upon the arrival of more suitable thermometers. The foundations of all buildings were checked. All those erected last year are so far holding up well but a distinct settling of the ground underneath heated buildings indicates a recession of the permafrost which although it is not yet serious will become serious if allowed to continue unchecked.

Soil samples were taken in various locations, the samples of permafrost being kept in their frozen condition to be tested in the soil mechanics laboratory at the University of Alberta.

A thorough study was also made of the roads in the area to check on the suitability of the various methods of construction. Profiles of the frost line were obtained to indicate the type of sub-grade encountered in a typical road in the district.

Entomology

Dr. William Hovanitz, of the Laboratory of Vertebrate Biology, University of Michigan, reports that he spent the latter part of June making population analyses of gene frequencies of the colour phases of arctic Colias along the route of the Alaska highway. The earliest species to appear in the area is *C. hecla* which flies at temperatures just above freezing. This species also flies to the north in the arctic islands and Greenland. An amateur collector of Edmonton had taken the species far to the south at Nordegg, Alberta in a bog similar to those of the north. Unfortunately, road conditions made a visit to the place impossible this year. *Colias hecla* was studied in the area from Lake Teslin, Y.T. to the Alaskan border. It is apparently absent in the Tanana river region of Alaska but present in the mountains from the St. Elias range through the Wrangell, Alaska and Chugach ranges. It has been recorded before for the north and west coasts and the Mt. McKinley region of Alaska. The larval food plant has been determined as a bog species of *Hedysarum;* collections were made for further identification. The white female frequency was determined at over 60% white in the Yukon and Alaska territories. *Colias philodice* was studied over the same terrain but was not found to be so specific as to habitat. The white female frequency indicated thus far is nearly 100% white. Of interest is the fact that whites have not been taken in the Edmonton area where the females are 100% coloured. The remainder of the season was spent studying the relationships between the species as they are found on the tongues of tundra which extend south from the true tundra of the north into the mountain ranges southward.

Dr. Hovanitz has drawn maps to show the known distributions of *Colias* species in North America and of the frequencies of the colour phases. All species have the highest frequencies of the white gene (and phenotype) in central Alaska.

Radio

Mobile Ionospheric Observatory

Canada's first mobile ionospheric observatory was put into operation on August 23, 1948 by the Defence Research Board on the railroad to Churchill.

The new observatory housed in a converted railway coach, is expected to be a vital link in an international chain of stations supplying information essential to the development of radio communication and radio navigation in the north.

Canada already has a number of ionospheric stations in operation in the north country but this is the first mobile observatory to be used in this important research work. The "lab" will operate under the direction of Mr. J. H. Meek of Defence Research Board headquarters

in Ottawa, and will operate over the Hudson's Bay Railroad between Portage la Prairie and Churchill. One round trip will be made every three months, in each of the four seasons of the year, with week-long stops going and coming at such intermediate points on the rail line as The Pas, Waboden, Pickwitonei, Gillam, Herchmer and Churchill.

The auroral (northern lights) zone, which covers all of northern Canada, is highly suitable for the study of ionospheric conditions because charged particles, emanating from the sun, are deflected closer to earth by the earth's magnetic field in this area. The charged particules come from sun spots which last year reached their highest point in 200 years of recording.

The new mobile ionospheric station will send radio beams as high as 200 miles above the earth. These are reflected by the ionosphere to the point of origin, and from the beams can be deduced required information about conditions in the upper regions. Based on this information, predictions can be made of future radio transmission conditions and selection of suitable frequencies for long distance radio communication is made easier.

The recordings of Canadian stations are coordinated with those of 63 other stations in various parts of the world, and from the mass of information are produced monthly predictions of useful radio frequencies and daily ionospheric storm warnings.

Zoology

Mr. H. F. Quick, of Colorado A & M College, Fort Collins, Colorado, continued his study of the habits and economics of fur animals as factors of management and conservation. Field work was curtailed during April in order to do laboratory work. Only a few trips were made for the purposes of studying methods of beaver hunting and obtaining notes on the habits and abundance of animals. An unusual and prolonged break-up resulted in serious delay and limitation of the activities of the beaver hunters. Travel in the bush during this period was not impossible but due to snow conditions was quite difficult. The beaver hunters were idle for about a month during the hiatus between seasons suitable for travel by dog team and by boat. Professor Quick travelled about 200 miles by dog team during April.

The greater part of the period from April 1 to June 30 was spent examining zoological specimens which were procured earlier. Specimens of fur animals examined totalled 223, and altogether more than 500 specimens of animals were examined. Over 3000 raw furs were examined for primeness and quality. Among the materials preserved were 209 fur animals skulls from which sex-age classification studies will be made. Other material also preserved were stomach contents, reproductive organs and endoparasites of the fur bearing species.

In order to evaluate comparatively the conditions of the fur resource a period of three weeks was spent interviewing traders and trappers in the territory adjacent to the Fort Nelson region. This objective was approached by visiting trading posts on the Nelson, Liard and Lower Mackenzie rivers between Fort Nelson and Aklavik. The trip of about 1200 miles was made by river boat. Information was obtained in this manner regarding conditions of fur animal and prey species populations and of trapping and travel techniques.

NEWS FROM HIGH LATITUDES

Shipping at Churchill

A record season of grain shipments was reported from Manitoba's arctic seaport Churchill during 1948. The navigation season opened officially on August 8 with the arrival of two steamers from the United Kingdom. A record of 5,250,000 bushels of wheat was reported to have been exported before the season closed.

Three Canadian naval vessels entered Hudson Strait during the past summer, two of them continuing to Churchill. The third, H.M.C.S. *Magnificent* an aircraft carrier went as far as Wakeham Bay, Que., before returning to Atlantic

waters. The two others, both destroyers, spent five days at Churchill, and made other calls at Coral Harbour, Southampton Island and several small settlements on Hudson Strait. The vessels carried, in addition to their usual crew, a few scientific observers including representatives of the Defence Research Board, Department of Transport and Department of Mines and Resources.

Reforms in Greenland

Reports from Denmark and Greenland make it clear that important reforms are to be anticipated during the next few years. Shortly after the end of the last war, the Greenland Council, sitting in Godthaab, recommended certain reforms to the Danish Parliament. In 1946 negotiations were carried on in Copenhagen between representatives of Greenlanders and the Danish government, and a five year plan of economic, educational and social reform was drafted. Experience since 1946 has demonstrated that progress in Greenland can be much more rapid than was anticipated, and a completely new approach to the question is now being made.

Prime Minister Hans Hedtoft with two Parliamentary representatives visited the colony during the past summer. A meeting was held with Greenland representatives at Godthaab on August 4 and agreement was reached about proposed reforms. It is reported that industrial plants such as the coal mines at Kutdligssat on Disko Island are to be modernised, new power plants, harbour works and better roads are to be built, and for the first time private capital is to take part in the fishing industry and possibly in other commercial activities. New schools are being erected including two for training in home economics. An interesting change is to be the emphasis on the use of Danish as the medium of instruction in schools—a reform requested by Greenlanders in 1945.

Navigation along the intricate west coast of Greenland is to be facilitated by erection of a number of lighthouses, possibly as many as twenty. They are likely to be erected at important ports such as Julianehaab, Egedesminde, Frederikshaab, Godthaab and Sukkertoppen. The lighthouses are to be automatic and operated by gas supplied from cylinders.

Weather station program

Little has been reported in North America about the elaborate program of weather station construction going on in Greenland under Danish auspices. It has been estimated that about six and a half million kroner will need to be spent to set up the stations at present planned. Apart from such new installations, it should be recalled that Denmark took over a number of United States stations built during the war. New weather stations are being built, or have already been completed at Thule, Upernavik, Godhavn, Egedesminde, Holsteinsborg, Sukkertoppen, Godthaab, Frederikshaab, Tingmiarmiut (south-east coast), Angmagssalik, Aputiteq, Kap Tobin (Scoresbysund) Daneborg, Danmarkshavn. To make this elaborate building program possible a considerable number of skilled craftsmen were sent to Greenland from Denmark, 28 being needed to complete the work at Tingmiarmiut alone. Future plans call for new stations at Umanak, Kutdligssat, Christianshaab, Jakobshavn, Faeringerhavn, Tovkusak or Ravns Storö and Julianehaab.

About 98% of the equipment used in the new stations is of Danish manufacture, and is valued at about four million kroner. The work has required the shipping to Greenland of numerous motor vehicles—a new departure in all but a few settlements. Operation of the new stations will require the services of more than a hundred additional trained personnel, the cost of operations being about three million kroner a year.

It is hoped that at any rate a part of this very large cost may be borne internationally through the International Civil Aviation Organization.

H.B.C. Trading Transport in Arctic Canada

During the summer of 1948 entirely different freighting arrangements were established as compared with previous years. In place of the *Nascopie*, the motor vessels *Terra Nova*, *Clarenville* and *Earle Trader* were chartered by the Hudson's Bay Company and these boats, together with the H.B.C. Motor Vessels *Eskimo* and *Fort Severn*, took care of

all the Company's freighting obligations throughout the Eastern Arctic. In the Western Arctic the R.C.M.P. Schooner *St. Roch* and the Company's Schooners *Fort Ross* and *Nigalik* delivered a record tonnage. The Air Transport Division is making an important contribution in the general supplying of posts and in facilitating inspection tours of Company executives. In the first six months of 1948, three quarters of a million pounds of freight were carried by the three aircraft (two Norseman and a Canso) and 103,000 passenger miles flown. In their travels, the aircraft have covered every area in which the Fur Trade operates.

In August, the Canso–*Polar Bear*–piloted by J. S. Coombes, veteran bush and R.C.A.F. flier, carried out a 7,000 miles tour of inspection, visiting all posts on Baffin Island, and a number more in the Straits and Bay, and Western Arctic. In the course of this trip a site was selected in Spence Bay for the establishment of a new post which will replace Fort Ross, closed earlier in the year. In August, 1947, the same plane had made another 10,000 mile Arctic flight. Although freighting is the main function of these planes, they are also used extensively for inspection work and the transportation of personnel and their families to and from posts.

Norwegian Polar Activities

Two items of interest are reported from Norway concerning the Antarctic. The Government has introduced legislation to change the status of the Norwegian Sector of the Antarctic continent (Queen Maud's Land). This territory was annexed in 1939. In future it is to become a *biland* or dependency having the same status as Svalbard. Bouvet and Peter I islands have been administered in this way since 1939.

The Norwegian Parliament considered on May 21st, 1948, a Bill submitted by the Ministry of Commerce about the proposed Norwegian - Swedish - British Antarctic Expedition. The Bill outlines preliminary plans for the Expedition and states the scientific aims as including studies of meteorology, topographical mapping, geology, cartography, ice reconnaissance, aurora photography, magnetism and cosmic ray observations. It is stated that a preliminary map of the Queen Maud Land coast has been compiled from airplane photographs taken by the German "Schwabenland" expedition in 1939.

Aircraft will be used for survey and transport, and a party of at least twelve, of whom six should be scientists, is contemplated. General direction of the expedition is to be under the Norsk Polarinstitutt in cooperation with the Norwegian Geographical Society and with the United Kingdom and Sweden. Costs will be shared between the three countries. Work will begin during the 1949-50 season, the party remaining for two winters.

News items from beyond the North Pole

News about the Soviet Arctic is not easy to secure. *Arctic* is all the more grateful to Dr. Vilhjalmur Stefansson for making a number of brief news items available from his library.

News of the USSR from Vokrug Sveta, No. 6, June 1948

The North-Western Section of the Expedition of the Institute of Ethnology is carrying on an anthropological-ethnographical study on the Chukotsk Peninsula and in Kamchatka.

Leningrad astronomers are working in the Murmansk Region studying Aurora Borealis. They are taking coloured photographs of the northern lights.

This year, the dean of Russian icebreakers, *Ermak*, is celebrating her 50th birthday. She was built in Newcastle in 1898, according to the plans of Admiral Makarov.

L. S. Berg has discovered in the Leningrad Archives seven books of notes by F. P. Litke, taken during his round the world trip. They contain notes on England, Germany, Italy, Denmark, Turkey, etc.

A committee has been set up in Leningrad to organize the celebration of the 300th anniversary of the discovery of Bering Strait by Semen Dezhnev. He proved that Asia and America were not connected. A special conference will be held on the day of the anniversary, and several exhibitions will be on view. A popular pamphlet on great discoveries by Russian seamen will be published.

Books

V. Y. Vize has completed a new historical work devoted to 100 Russian explorers-navigators. Among them are: Savva Loshkin, the first to circumnavigate Novaya Zemlya; Fedor Rakhlin who wintered for 26 consecutive winters on Novaya Zemlya; Semen Dezhnev, the discoverer of Bering Strait.

On the occasion of the 60th anniversary of the death of the Russian explorer Miklukhamaklai, the All-Union Geographic Society and the Institute of Ethnography of the Academy of Sciences, are preparing an edition of the works of the explorer, in 5 volumes.

A collection of documents on G. I. Shelekhov is soon due to appear, published by *Geographical Publishers.*

A second edition of the Diaries of O. E. Kotzebue—the first edition appeared in 1821-23—describing his three round-the-world voyages, is due to appear shortly.

In 1947, the State Geographical Society published three books in the series "Russian Travellers". One is by K. Kunin, *The Travels of Afanasii Nikitin*; the other by Bessonov & Yakubovich, *In Inner Asia—The Travels of Valikhanov Potanin;* and the third by V. V. Obruchev & Fradkin, *In Inner Asia—Travels of V. A. Obruchev and M. V. Pevtsov.* Two other travel books are ready for publication: A. D. Dobrovolski, *The Voyage of F. P. Litke*; and S. N. Markov, *Semen Dezhnev.*

Roster of Arctic Specialists

The Arctic Institute Roster of Arctic Specialists is progressing satisfactorily. Approximately 5,000 questionnaires have been distributed in Canada, Alaska and the continental United States. More than a thousand completed questionnaires are already prepared for inclusion in the roster. In addition to Associates of the Arctic Institute, persons invited to provide information have been selected from government agencies in Canada and the United States, from traders, mining companies, missionary organizations and others having business in the North.

Free Ride to Arctic Port

Travellers from the Canadian western arctic report an unusual journey by the Roman Catholic Mission supply ship *Lady of Lourdes* during August, 1947. The vessel was enroute from Tuktoyaktuk to Coppermine when she became caught in heavy ice. Forced on top of the ice about 200 miles west of Coppermine, she drifted to within about twenty miles of the post during the next three days. In Coronation Gulf, the Hudson's Bay Company trading schooner *Fort Ross* was able to tow *Lady of Lourdes* off the ice into the water. The schooner was undamaged.

Aklavik on the Air

Radio station CHAK operated at Aklavik, N.W.T., by the Royal Canadian Corps of Signals is bringing news, music and education to the far northwestern part of Canada's mainland. The station was constructed from odds and ends as a hobby by operators of the Canadian Government commercial radio station. In January, 1948, its staff shared in a joint program with Australian operators on Heard Island in the Southern Ocean.

Canadian Need for Qualified Scientists and Administrators in the North

Dr. H. L. Keenleyside, Commissioner of the Northwest Territories of Canada, and a Governor of the Arctic Institute, recently wrote to the Presidents of Canadian Universities to draw their attention to northern careers open to graduates. Recalling that certain fields of science remain almost untouched in northern Canada, Dr. Keenleyside suggested that both government and private agencies are interested in assisting outstanding students to become Arctic specialists. The Arctic Institute was mentioned as one organization prepared to advise on professional openings likely to be available to young graduates.

Explorers in Carnegie Hall New York

Carnegie Hall has placed in the entrance lobby photographs of distinguished polar explorers who have appeared on programs there. Under each photograph is a brief caption, which Dr. Vilhjalmur Stefansson was asked to prepare. He has been good enough to provide a copy of the texts so that readers

of *Arctic* may have a record of them. The six names follow:

ROALD ENGELBREGT GRAVNING AMUNDSEN, medallist of the Explorers Club, was first to navigate the Northwest Passage all the way through in one direction by ocean-going ship. He was first to reach the South Pole and first to cross the Arctic Sea in a dirigible.

RICHARD EVELYN BYRD, medallist of the Explorers Club, was one of the early flyers to cross the Atlantic. He was first to reach both North and South Poles by air, and commanded the largest expedition that ever sailed to the Antarctic.

ROBERT EDWIN PEARY, medallist and president of the Explorers Club, discovered Peary Land, the most northerly land in the world. He was first to prove that Greenland is an island and first to reach a pole of the earth, the North Pole.

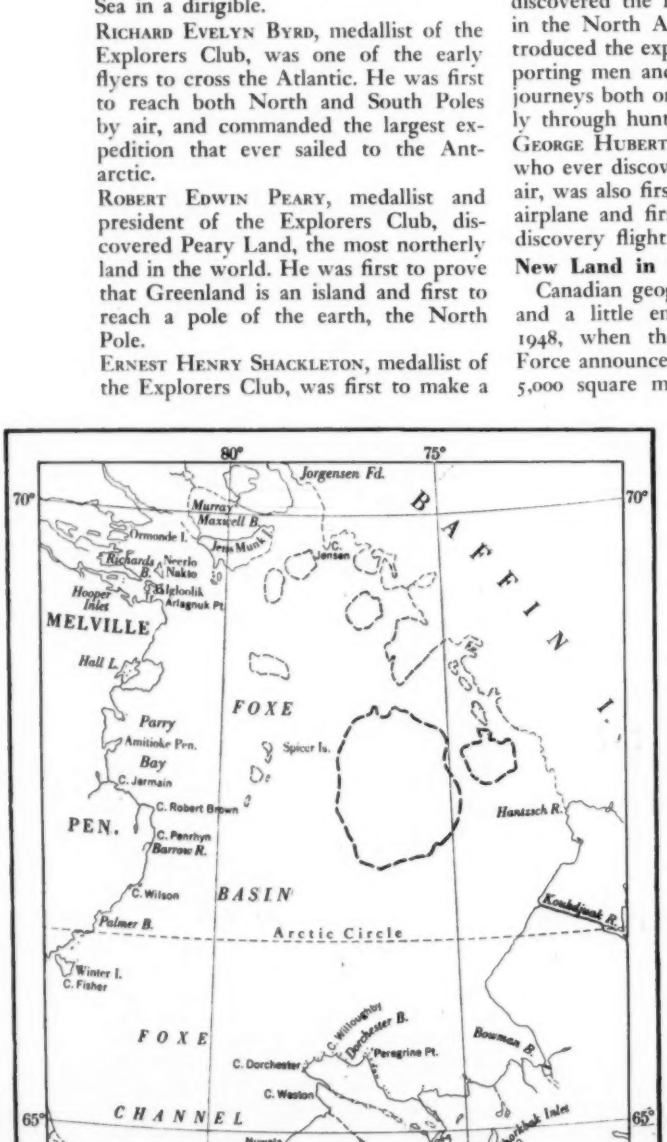
ERNEST HENRY SHACKLETON, medallist of the Explorers Club, was first to make a notable overland journey in the Antarctic, when he got within 97 geographic miles from the South Pole. This is considered the greatest achievement with man-hauled sledges in the history of exploration.

VILHJALMUR STEFANSSON, medallist and twice president of the Explorers Club, discovered the last islands to be found in the North American Arctic. He introduced the exploration method of supporting men and dogs on Arctic sledge journeys both on sea and land exclusively through hunting.

GEORGE HUBERT WILKINS, first explorer who ever discovered new land from the air, was also first to cross the Arctic by airplane and first to make an extensive discovery flight in the Antarctic.

New Land in Foxe Basin

Canadian geographers were delighted, and a little embarrassed during July, 1948, when the Royal Canadian Air Force announced the discovery of about 5,000 square miles of territory in the middle of Foxe Basin. The discovery was made by a photographic Lancaster aircraft based at Frobisher Bay, southern Baffin Island. The land was first seen through a rift in clouds, and the navigator assumed that he had miscalculated his position and that he was over the coast of Baffin Island. A later check proved that the land was in fact an unmapped island about 85 miles by 75 miles, lying east of Spicer Islands. It has since been photographed and located approximately on Canadian 8 mile



Two newly-discovered islands are here shown added to the map of Foxe Basin. Their precise shape and character still remain to be determined.

aeronautical charts. This recent addition to Canada's arctic territories is some compensation for the large piece of Foxe Peninsula which was removed from the map following the Putnam expedition of 1927.

Location of the new land need not have been a complete surprise to careful readers of T. H. Manning's reports on his exploration of Foxe Basin. Writing in "The Foxe Basin coasts of Baffin Island" (*Geog. Journal* Vol. CI, Nos. 5 and 6, May-June 1943) on page 240 he states: "The behaviour of both ice and tides in Wordie Bay suggest the probability of islands farther south than any I have shown on the present map. The first time I was on Parry Point I was almost certain there was land some 30 miles due west. When I was again there however conditions were not favourable for observations."

French Expedition to Greenland

Reports have been received at the Institute Headquarters from M. Paul Emile Victor on the progress of Expeditions Polaires Francaises. The first report dated July 22, 1948 comes from the Greenland expedition which was at that time establishing its fourth camp on the western edge of the Ice Cap at an altitude of about 1500 metres, inland from the crevasse zone in about latitude 70° N. Having laid this depot the expedition had achieved the main objective of the 1948 season. It has now returned to France to complete arrangements for the one or two year main expedition to start in the spring of 1949. Readers of *Arctic* having access to *Grönlandsposten* can read in the issue for July 1st, 1948 a report on progress of the expedition to that time, illustrated with an attractive woodcut map. Work of the expedition has been greatly assisted by the services of twenty Greenlanders under the leadership of Peter Rosing. The latter will be remembered as having been clergyman and school teacher at Angmagssalik in the early thirties when Gino Watkins' expeditions were based in that area.

French Antarctic Expedition

The Adelie Land Antarctic Expedition is referred to in a progress report received at the Institute. Two members of the party, including the leader-designate M. André Liotard visited the Antarctic during the 1947-48 summer on British and Australian vessels. A ship of the same type as that used by the Ronne expedition has been obtained and plans were well advanced for a preliminary expedition in September 1948.

University Seminar in North American Arctic

McGill University, Department of Geography has organized a graduate seminar in the North American Arctic to be held in Montreal between October 1948 and April 1949. The program is comprehensive and because of its novelty is reproduced in outline:—Landforms, Dr. A. L. Washburn; Mining and Mineral Resources, Dr. A. W. Jolliffe; Glaciology and Permafrost, P. D. Baird; Climate, F. K. Hare; Oceanography and Marine Biology, Dr. M. J. Dunbar; Plant Life and Agriculture, Dr. Nicholas Polunin; Wildlife, T. H. Manning; Fur Trade, L. Butler; Native Peoples, Douglas Leechman; Political Considerations, Col. Wilfred Bovey; Commercial Aviation, Dr. Trevor Lloyd; Economic Future, Dr. G. H. T. Kimble.

Antarctic Whaling

It is estimated that more than 6,400 Norwegian whalers and factory workers will be spending the coming season in Antarctic waters. With the addition of the new floating factory *Thorshövdi* the 1948 fleet will be made up of ten factory ships and a hundred whale boats. This is approximately the size of the pre-war fleet. Several firms have purchased wartime corvettes which will be used to tow the whales from the catchers to factory ships, in this way increasing the effectiveness of the fleet.

Using nine factory ships, Norwegian whalers in 1947-48 caught and processed 935,902 barrels of whale oil and 54,741 barrels of sperm oil. Including the output of one land station the total production was 1,046,100 barrels. If as is anticipated the catch for 1948-49 reaches 1,200,000 barrels, and there is no change in prices, the whaling industry may bring in about $88,000,000. The opening date of the coming pelagic whaling season is December 15.

Alaska Railroad Being Modernized

On July 15, 1948 the twenty-fifth anniversary of the driving of the golden spike into the last tie of the Alaska Railroad was celebrated. In the past the line has been operated at a considerable loss to the United States Government which owns and operates it. As part of a three-year plan to spend $50,000,000 in modernizing the 425 mile line which runs from Seward on the Gulf of Alaska to Fairbanks, about $21,000,000 is being expended in the first year on converting railroad cars, improving the roadbed, purchasing 200 miles of steel rail and constructing new terminal buildings. Nearly four hundred wartime military sleeping cars are being converted to boxcars; a new freight and passenger terminal is being built at Fairbanks and much of the line is being reconstructed by widening, filling and raising the roadbed.

Trichinosis from polar bear meat

Dr. Vilhjalmur Stefansson has passed on to *Arctic* an interesting item of news received in correspondence with Captain John Giaver of the Norsk Polarinstitutt, Oslo, Norway. The Institutt learned through a report made by a German meteorologist Dege that a German weather station had been established in the western part of Frans Josef Land early in October 1943. The party consisted of eight to ten men. In the late spring of 1944 the whole party was taken ill after eating polar bear meat infected with trichinae. The leader, Lieutenant Markus, was able to inform the German naval authorities and a plane was sent to the rescue. In making a very dangerous landing the wheels were damaged, but the doctor on board was able to care for the invalids. Finally the whole party was flown out to Oslo, where some members remained in hospital for several months.

Apart from the news that there was a German weather station in Frans Josef Land, this communication introduces the extremely important question of the infection of polar bear meat with trichinae. Captain Giaver in writing to Dr. Stefansson states that all Norwegian Arctic stations have been warned of the danger of eating infected bear meat, and that samples taken from all animals are being collected for examination. Beginning in the 1949 Spring all Norwegian sealers will cooperate in collecting specimens. Professor C. S. Aaser of the Norwegian Veterinary Institute has already examined seven samples from different bears shot in Svalbard. All of them contained trichinae.

Norwegian scientists believe that it may be worth while for tests to be made in arctic North America to discover whether polar bears are infected with trichinae, and if they are to trace the source of the infection. Reports of cases of trichinosis among northern residents would also be a useful addition to the present enquiry.

New Arctic Fishing Bank

A new hunting ground for Greenland sharks, a source of medicinal liver oil, has been discovered by fishermen from Aalesund, Norway, recently returned from a 4-month expedition north of the 76th parallel. Operating two deep-sea fishing craft, the men reported a successful season in these new waters and had aboard some 800 barrels of shark liver oil. The new field is said to lie off northwestern Greenland south of Ellesmere Island. Skipper Rasmus Ervik described how the two boats arrived at the edge of the ice in early June and how they fished in front of the receding ice line north to Ellesmere Island by September. Radio telephone communication between the boats makes it possible to plot the course of the fish schools.

Short-Wave to Antarctica

With over 6000 Norwegian whalers in the Antarctic this season, Norway's powerful short wave transmitter at Fredrikstad is being readied for a full schedule of broadcasts. Crews and workmen aboard Norwegian whaling factories generally sail in late September or early October, returning home in April or May of the following year. For them, the radio is the only tie with the homeland during this whole period. The new 100 KW station at Fredrikstad, which opened in May of this year, beams regular daily programs to the men aboard these vessels. Antarctic broadcasts are transmitted on the 13 and 25 m. bands.

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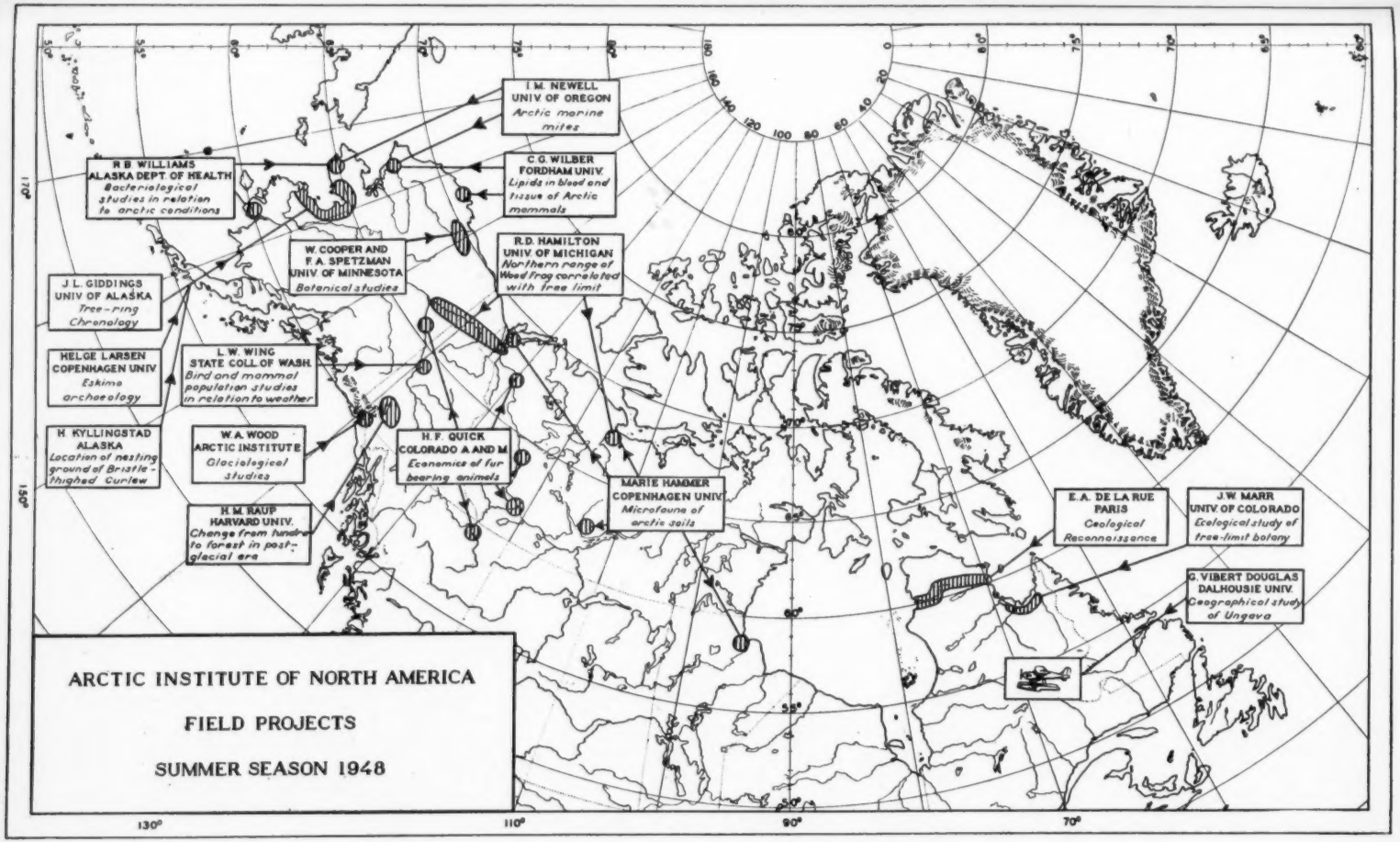
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